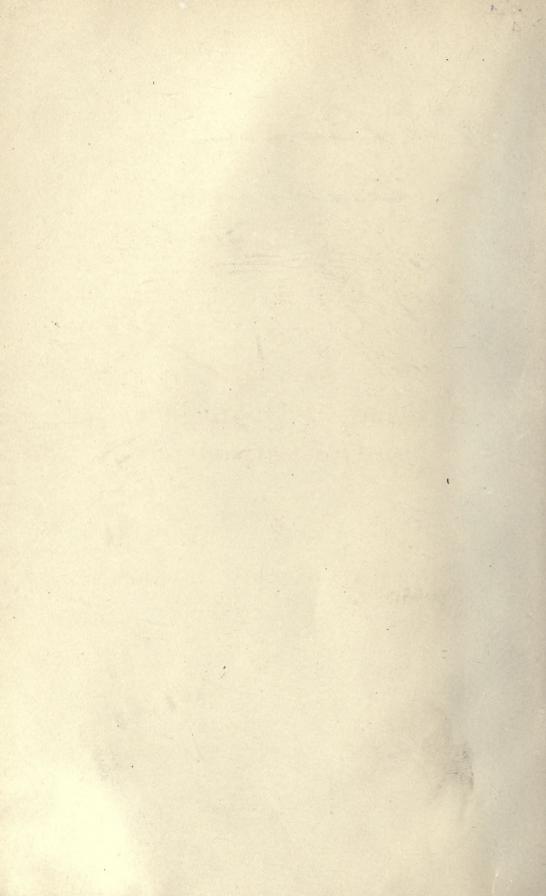








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ELEVENTH ANNUAL MEETING

of the

American Academy of Ophthalmology and Oto-Laryngology

OPHTHALMOLOGICAL DIVISION

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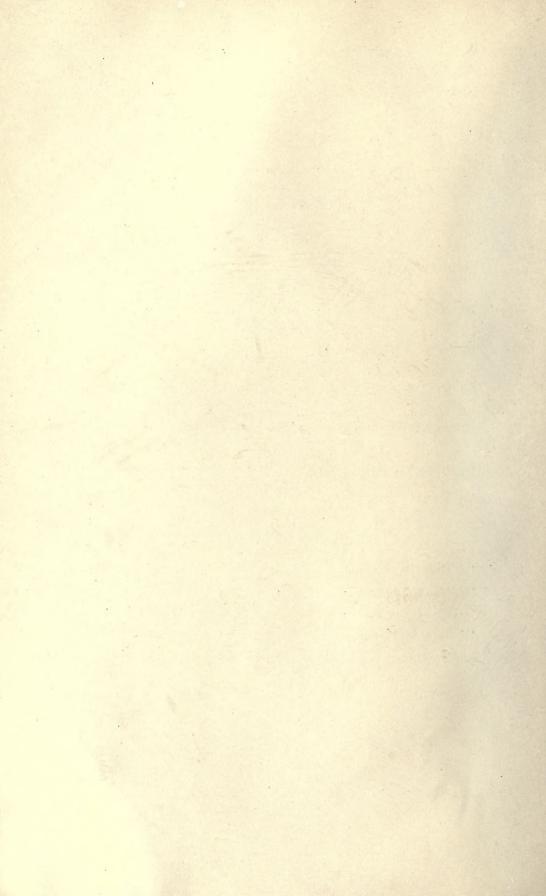
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The Twelfth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology will be held at Louisville, Ky., Sept. 26, 27, 28, 1907.

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OPHTHALMOLOGICAL SECTION.

TABLE OF CONTENTS.

| | PAGE. | | |
|---------------------------------------|--------------------------------------|--|--|
| President's Address. Symptoms Con | | | |
| | ities. CASEY A. WOOD 1 | | |
| Oration: Certain Affections of the (| | | |
| Obstructive Diseases of the Retinal V | | | |
| Occlusion of a Branch of the Central | Artery of the Retina. George F. | | |
| Keiper | | | |
| Treatment of Partial Optic and Re | tinal Atrophy by Electricity and | | |
| | | | |
| Extraction of Cataract Within the | | | |
| | D. W. GREENE 70 | | |
| Cataract Extraction and Preliminary | | | |
| On the Colloid Excrescences and The | ir Influences on the Ossification of | | |
| the Chorioid. ADOLPH ALT | 90 | | |
| Spontaneous Dislocation of Both Cr | ystalline Lenses in Two Members | | |
| of the Same Family. ALVIN A | | | |
| A Statistical Inquiry as to the Rel | | | |
| | tion. Albert Rufus Baker 100 | | |
| | | | |
| | SCHNEIDEMAN | | |
| | GENE SMITH and HENEAGE GIBBS 130 | | |
| Punctate or Hyaline Opacities of th | | | |
| | | | |
| Treatment of Acute Suppurative | | | |
| | 137 | | |
| Syphon Eye Compress. O. A. GRIFFI | N | | |
| DISCUSSIONS. | | | |
| PAGE. | PAGE. | | |
| Alleman, L. A. W 51 | Lichtenberg, J. S52, 69 | | |
| Alt, Adolf | Lukens, Charles 52 | | |
| Baker, R. A 124 | Means, C. S122, 123 | | |
| Bulson, H. E 133 | Minney, John E124, 140 | | |
| Buxton, L. H | Mittendorf, W. F 53 | | |
| Case, G. M | Parker, W. R | | |
| Ellett, Ed. C68, 69 | Reber, W52, 88, 123, 129, 132 | | |
| Faith, Thomas 100 | Schneideman, T 89 | | |
| Francis, L. M | Seaman, G. E | | |
| Greene, D. W | Smith, E | | |
| Gunn, R. Marcus50, 51, 132 | Vail, D. T | | |
| Hubbell, A. A | Valk, F 89 | | |
| Jackson, Ed87, 88, 129, 133 | Willis, E. A69, 132, 133 | | |
| Keiper, George F | Wood, C. A124, 134, 137 | | |

OTO-LARYNGOLOGICAL SECTION.

TABLE OF CONTENTS.

| | P. | AGE. |
|--|--|------|
| Vice-President's Address. The Relation | n of the Pathologic Conditions of | |
| the Nose and Accessory Sinuses | to the Visual Apparatus. J. A. | |
| | | 145 |
| Oration. Practical Problems in Oto | ology and Rhinology. DUNDAS | |
| GRANT, London, England | | 152 |
| Report of a Case of Acute Mastoiditi | s, Complicated by an Extensive | |
| Destruction of the Esophagus v | vith Rupture of the Esophagus, | |
| Leading to a Profuse Hemorrha | ge into the Left Pleural Cavity, | |
| the Stomach and Mediastinum. | J. O. McReynolds | 175 |
| Aspiration of the Tympanic Cavity is | | |
| | | 185 |
| The Safest Method of Using Paraffin S | | 189 |
| Cerebral Complications of Suppuration | | -00 |
| | | 192 |
| Rapid Convalescence After Mastoid Ope | | |
| Importance of an Early Diagnosis of M | | 100 |
| - | ······································ | 206 |
| Sarcoma of the Nose, with a Consider | | |
| | ROBERT LEVY | 917 |
| Cleft Palate and Harelip. KATE W. BA | | 233 |
| Complete Removal of Faucial Tonsils. | | |
| Considerations Relative to Nasal Obsti | | |
| Pathologic Condition of the Naso-Phary | | |
| Cerebellar Abscess Following Acute Su | | 200 |
| | LACK | 989 |
| Is the Spray Apparatus an Indispense | | 209 |
| | tole Equipment of Kninologists? | 074 |
| Is It Necessary to Open the Antrum in | | 214 |
| | Every Case of Mastolu Opera- | 260 |
| Improved Nasal Scissors. O. A. GRIFFI | | |
| Some Improved Nose, Throat and Ear I | | |
| Some improved Nose, invat and Ear i | neutuments. E. I INCHON | 201 |
| DISCUSS | SIONS | |
| PAGE. | | AGE. |
| Baker, C. H | Holinger, J203, 216, | 232 |
| Baldwin, K. W232, 243 | Large, S. H | |
| Black, W. D | Levy, R | |
| Ballenger, W.202, 203, 215, 243, 279 | Mayer, E215, 216, 217, | |
| Beck, J201, 233, 242, 284 | Miner, C. L. | |
| Brunk, T. L | Miner, S. W | |
| Bryant, W. S 205, 206, 285 | Pierce, N. H. | |
| Cott, F. C 285 | Pynchon, E | |
| De Vilbiss, A | Shurley, E. L. | |
| Ellett, E. C | Spohn, G. W. | |
| Friedenberg, P202, 205, 273, 284 | Stein, O. J | |
| Grant, D204, 214, 215, 232, | Stucky, J. A200, 203, | |
| 266, 278, 283 | Vail, D. T | |

PRESIDENT'S ADDRESS.

ON SOME OCULAR SYMPTOMS COMMON TO OR PRO-DUCED BY AFFECTIONS OF THE NOSE AND ACCESSORY CAVITIES.

CASEY A. WOOD, M.D., C.M., D.C.L. CHICAGO.

The fact that pathologic processes affecting the nasal passages and other neighboring cavities may involve various parts of the ocular apparatus has long been known. The extent to which and the precise conditions under which this involvement may take place are not, as yet, definitely understood in all instances, although much has recently been done to place the relationship between eye and neighboring cavity diseases upon a firm footing. It is not the purpose of this address to consider these subjects in detail, but rather to emphasize the importance of a few conditions that, equally from the standpoint of the ophthalmologist and the rhinologist, seem especially worthy of notice.

Both ocular and neighboring cavity affections are a fruitful source of headache, acute, subacute and chronic. Indeed, they form one of the most constant and most annoying of the reflex symptoms one has to deal with.

Headache.—In spite of all that has been written on the subject, the differential diagnosis between headache due entirely to neighboring cavity affections and that due to eye diseases alone has not been clearly established. It must have been the experience of the fellows and members of the Academy—as it has been of your orator—that glasses have been prescribed and other eye treatment given for the relief of a frontal headache subsequently shown to be due to ethmoidal disease or infection of the frontal or other accessory sinus. Per contra, it is not infrequently observed that only after making the devious nasal passage straight or after resorting to other remedial measures does the rhinologist suspect that his patient's uncured headache may be due to eye-strain. While evident defects in the ocular refraction or a decided lack of balance in the eye muscles (or both together) or the presence of a painful disease of either eye may properly give rise to suspicion that the diseased

organ is responsible for the headache, it must be remembered that the character, site and other peculiarities of the head pains greatly assist in a diagnosis and help us to a conclusion as to their true character. In other words, while the actual alterations in the tissues and abnormality of function must ever be the chief guides in the differential diagnosis of neighboring sinus and ocular headache, the clinical evidence is of extreme value and must not be neg-This is all the more true because in reflex headache the underlying nervous state is of just as much importance as the gross pathologic changes in producing these symptoms. Inasmuch as the proportion of ideally perfect nasal cavities or perfectly normal eyes is small, in the presence of headache one can not always judge from the local conditions alone whether he is dealing with a patient in whom an unstable nervous system is reacting to an otherwise insignificant irritant in the form of a slight nasal or ocular defect, or whether the headache arises from quite another cause. The following clinical picture of the usual form of ocular headache will serve to emphasize this point:

Ocular headache from eye-strain is almost invariably bilateral. It is rarely severe or accompanied by nausea or vomiting and it is practically always a daylight headache. It does not keep the patient awake at night, because when the lights are turned out there is no use made of the eyes. There is no eye-strain and consequently no reflex pains. Head pains from eye defects are almost invariably frontal, temporal or occipito-frontal. Vertical or general headache or pains confined to one side of the head or to the occiput or nuchal region alone or very severe acute pain in any part of the head is probably not of ocular origin.

True eye headache generally follows or is, at least, associated with other eye signs and symptoms. There is a hyperopic astigmatism or some other irritating form of refractive error, some anomaly of accommodation or some marked extrinsic muscular imbalance. Headaches from eye-strain generally follow prolonged and continuous use of the eyes for near work, such as reading, sewing, writing, china painting, etc.

Much use of the eyes in the distance brings about a similar result. An ocular headache is often the aftermath of a shopping excursion, a railway journey or a visit to the theater. Headache from eyestrain is often accompanied by pain in the eyes themselves, redness of the ocular and palpebral conjunctivæ, blepharitis, catarrhal discharge and other evident signs of ocular involvement.

It must not be assumed from the foregoing that ocular pains and headache are always due entirely to the eye defects or entirely to diseases of the nasal and accessory cavities. On the contrary, it should ever be borne in mind that the headache primarily set up by an uncorrected astigmatism may be aggravated or precipitated by a nasal "cold" or by the nervous irritation of an infected sinus. In other words, there is such a condition as a mixed, naso-ocular headache.

Vertigo.—That dizziness may be set up both by affections of the accessory sinuses and by ocular defects is a fact frequently referred to by authors, but the differential diagnosis of this symptom has been insufficiently discussed. The diseases of the ocular apparatus generally responsible for it are the heterophorias and heterotropias of a paretic character. The vertigo that so often results from paralysis or paresis of the extraocular muscles requires little knowledge and, at most, a superficial examination to determine its exact nature. On the other hand, the etiology of that troublesome, if temporary, dizziness accompanying the ocular imbalance that wavers between a heterophoria and a heterotropia is less readily referred to its proper origin and may easily be regarded as a nasal reflex or attributed to other causes.

Because of this difficulty in diagnosis it may be well to draw a clinical picture of ocular vertigo. Ocular vertigo rarely, if ever, occurs unless both eyes are used (or an attempt is made to use them) at the same time. Patients are sometimes conscious of this and in crowded thoroughfares, or when compelled to use their eyes for some time in steady fixation, or are suddenly called upon to see distinctly, close one eye. This generally relieves or prevents vertigo and the diplopia that so often accompanies it.

'The fact that double vision is very often of so evanescent a character as to be barely recognizable as such by the patient, is a common co-reflex of vertigo, is made use of in establishing its ocular character. The means of detecting the amount and kind of heterophoria or heterotropia are so well known to ophthalmologists that it is hardly worth while to say aught about them here. A rough though effective test and one readily applied by the rhinologist is that with the red glass. The patient sits in a semi-darkened room. squarely facing a candle light from ten to twenty feet away. Cover one eye and place over the other a piece of dark red glass, thus directing his attention to the sort of image he should see with the uncovered eye through the tinted glass. The red image, of course, corresponds to the eye over which the tinted glass is placed; the ordinary candle flame to the other eye. Now uncover the second eye; if his eye-muscle balance is good he should see a single pink light—an image composed of the red rays of one eye and the clear

light of the other eye. If there is a marked tendency to diplopia he will see two lights—one red, one white—and their distance apart, relative position, tendency to approach or to further separate, etc., will give a fairly accurate notion of their degree and other characters. If there be no tendency in the two images to separate. and the single pink light continues to be seen for several minutes, the patient's vertigo is probably not due to oculo-muscular defects.

An aid to the diagnosis of ocular vertigo is the history of other eye symptoms. Frequently such patients complain of blurring of print in reading or that the letters and lines run together and get mixed up—experiences that are probably a sort of transient diplopia at the near point. They are also prone to complain of "panorama" headache (brought on by shopping, railroad journeys, attendance at theaters and the like) of car sickness and of photophobia. They are often relieved by the correction of an irritating hypermetropia or an astigmatism. If so, the remedy acts by relieving the associated muscular defect upon which the vertigo commonly depends. As with headache, the character of the vertigo throws some light on its origin, although it does not often distinguish ocular vertigo from other forms of these symptoms.

The words "confusion" and "uncertainty" describe many examples of dizziness arising from oculomuscular anomalies. The vertigo is rarely so marked that the patient staggers or falls. Moreover, vertigo from ocular defects is plainly the result of attempting to use the eyes. It almost never comes on while the patient lies in bed or is sitting quietly; he usually experiences it while walking in a crowded street or doing something associated with movement of objects or while rotating the eyeballs, and at the same time using his accommodation.

Apart from these two important symptoms—headache and vertigo—common to ocular and neighboring cavity diseases, there are a great many affections of the eye and its annexes that are set up, not by defects in the visual organ, but by diseases of the nose and nearby cavities. Many American writers, among them C. R. Holmes, W. Campbell Posey, Risley, Edward Jackson, John Green, Jr., St. Clair Thompson, Frank Brawley and Manning Fish, have drawn our attention to many functional affections and organic lesions for whose causation nasal and accessory sinus diseases are undoubtedly responsible.

Lacrimation.—Probably an increased flow of tears is more often a sign of nasal than ophthalmic infection or, to put it more concisely, the ocular irritation that results in the overproduction of tears or their insufficient drainage, or both, quite commonly originates in nasal disease. This is true even of those cases where organic changes are present in the lids, about the *puncta lachrymalia*, canaliculi, tear sac or nasal duct. In all instances of chronic lacrimitis especially, the nasal passages should be carefully inspected and any abnormalities likely to damage the lacrimal apparatus should be treated.

Of organic lesions resulting from nasal and accessory sinus disease it is impossible to speak in full detail. It has, however, been well established that, apart from orbital abscess and optic atrophy due to spread of infection from the ethmoidal cells or to bursting of an abscess originating in the frontal or maxillary sinus, numerous diseases of the eyelids, conjunctivæ, oculo-lacrimal apparatus, cornea, orbital muscles and even of the chorioid have been produced by nasal disorders.

Diseases of the lids are not only associated with affections of the nose and neighboring cavities, but they are sometimes directly the result of a sinusitis. A unilateral edema of the lids—most marked in the morning and aggravated by acute exacerbations of the chronic sinusitis upon which it depends—constitutes a very obstinate symptom until its true character is recognized and the cause removed. This nasal form of blepharitis often appears as a part of conjunctival folliculitis which persists unless the sinus implication is recognized and properly treated.

Perhaps the most interesting of all the ophthalmic sequels of accessory sinus infections and affections are pareses and paralyses of the extraocular muscles. About the occurrence of these there can be no doubt. The ophthalmologist should hesitate to label either of them "rheumatic" or "syphilitic" or "idiopathic" until he is assured that his patient is not a sufferer from sphenoidal or ethmoidal disease and that either of these affections, if present, has been adequately treated. The immediate cause of ocular pareses in nasal cases is probably a peripheral infection of the nerve filaments supplied to the muscles involved. This infection may take place both in purulent and simple catarrhal infections of the contiguous cavities.

Of still more importance to the ophthalmic surgeon is asthenopia of nasal-cavity origin. After the ophthalmologist has carefully corrected all errors of refraction and muscle balance without relief to the asthenopic symptoms (and these form a larger percentage of cases than the refraction enthusiast would have us believe), he should not forget that nasal and neighboring sinus diseases are often etiologic factors that he can not afford to ignore if he would cure his patient. It has long been my routine practice to have the

nasal cavities carefully explored in every case of obstinate asthenopia whether the patient gives a history of "catarrh" or not. In many of these instances treatment of the nasal apparatus has given brilliant ocular results.

In conclusion, the object of this address is not merely to emphasize what is already fairly well recognized, viz.: the dependence of many eve affections on diseases of the nose and accessory cavities. One must insist that the ophthalmologist should at least be able to recognize those nasal conditions that affect the eye and that the rhinologist should have an intelligent knowledge of the ocular symptoms and lesions produced by diseases of the nasal and accessorv cavities. The subject under discussion leads us still farther afield. It not only emphasizes the fact that the rhinologist should be a fairly well-educated ophthalmologist and that the ophthalmic surgeon ought to be a practical rhinologist, but it declares the wisdom displayed by the founders of the Academy in associating ophthalmology with oto-laryngology. Whatever we do in practice, whether we treat diseases of the eye, ear, nose and throat in their entirety or confine our attention to one or more of them, there can be no shadow of doubt but that many papers and discussions read in one section must have a practical interest for those fellows and members who commonly attend the other. In this and many other directions do we find confirmation of the truism that no specialty can have a proper or permanent place in medicine and surgery that attempts to stand alone. Neither ophthalmology nor oto-larvngology is sufficient unto itself; each is but a branch—albeit an important and flourishing branch-of that ancient and revered tree of medical "knowledge of good and evil."

ORATION.

CERTAIN AFFECTIONS OF THE OPTIC NERVE.

R. MARCUS GUNN, F.R.C.S. LONDON, ENGLAND.

Mr. President and Gentlemen:—You have done me a great honor, which I appreciate very highly, in asking me to deliver the annual oration in ophthalmology before this distinguished assembly. On behalf of your British colleagues, and on my own behalf, I thank you most cordially, and must beg your indulgence for any shortcomings of mine.

I propose asking your attention for a short time to certain affections of the optic nerve, and to some considerations which present themselves, founded on our knowledge of its anatomy and on clinical observations. I must at once say that I lay no claim to present new facts before you, yet I am supported by the hope that an analysis of recognized facts may not be uninstructive.

Of all the cranial nerves, those connected with vision are by far the most readily involved in disease, and an examination of this extra liability to suffer is called for. I shall accordingly begin by enumerating the different channels through which the optic nerve may be affected.

1. From its developmental history and from its structure the optic nerve is to be regarded as forming part of the central nervous system. Developmentally, we recognize that the retina and optic nerve are developed in an anterior outgrowth from the same mass of epiblast which forms the brain, while the spinal cord is formed in the posterior continuation of this epiblast. Anatomically, the optic nerve shows evidence of this origin in the presence of neuroglia, and particularly in the fact that the fibres do not possess any primitive sheath or neurilemma, being in this respect similar to those met with in the white substance of the brain and spinal cord, and unlike the fibres of the ordinary nerves of the body. There are strong arguments in support of the nutritive value of this sheath, with its cells, and regeneration of nerve fibres seems to be dependent upon it. Thus, just as obtains in the central nervous system proper, there appears to be no power of regeneration in the nervous elements of the retina and its nerve-a cell or fibre once destroyed is destroyed forever. (It is obviously necessary, however, to distinguish between such an anatomical destruction, and a physiological loss of function, the former includes the latter, but loss of function may exist without destruction and is often merely temporary, as for instance, the loss of conduction along nerve fibres occasioned by a temporary excess of pressure, such as occurs in a retro-ocular neuritis.) Furthermore, the anatomical absence of this neurilemma probably explains in part the greater proclivity of such fibres to degenerative processes. If we bear in mind, then, the fact that the retina and optic nerve do in reality form part of the central nervous system, it helps to explain the frequency with which these tissues may suffer together, though not necessarily equally or in their entirety, from the same general cause, as e. g., in tabes and in insular sclerosis.

- 2. The optic nerve, throughout its entire extra-cranial course, is enveloped by sheaths which are a direct prolongation of the meninges, and the spaces between these sheaths are continuous with the spaces between the meninges of the brain. The wider and more important of these intervaginal spaces of the nerve is the subarachnoid, because the subarachnoid space of the brain, with which it is in direct relation, contains a relatively large amount of the cerebro-spinal fluid, and is again in direct communication with the cerebral ventricular system through the foramina of Magendie and of Key and Retzius. This continuity between the sheaths, sheath-spaces and contained fluid of the brain and optic nerves, is of pathological importance, as explaining the possibility of a direct transmission of disease from brain to nerve, or vice versa.
- 3. Their position at the base of the brain renders the intracranial optic nerves, with their commissure and tracts, prone to suffer in inflammation of the basal meninges, and liable to be damaged by direct pressure of new growth, aneurism, or a distended third ventricle. It is sufficient to give bare mention to this cause of optic nerve disease here; the causation is obvious, and examples are not infrequent.
- 4. After its entrance into the optic canal, the nerve has, for the rest of its course, all the exposures of a peripheral nerve. Thus, while still in the optic canal, the nerve may be pressed upon unduly by a diseased ophthalmic artery; may be involved in a syphilitic affection of the bone or its covering; may suffer through the thin inner wall of the canal from an altered sphenoidal sinus; or may be injured in fracture of the base of the skull. It is important to remember that in this intra-canalicular part of its course, the dural sheath is intimately adherent to the bone, and is also closely



Fig. 1.—Emmetropic and hypermetropic eye.



Fig. 2.—Myopic eye.

Diagrammatic sections through sides of optic nerve entrance to show termination of intersheath space. (Graefe-Saemisch Handb. des Ges. Augenh. 2 te Aufl., 1900, von Greef 2 Teil, i, Bd., p. 54.)



Fig. 3.—Diagrammatic section through optic nerve entrance showing distended intersheath space.



applied to the pial sheath and optic nerve trunk, though not so intimately as to prevent all passage of fluid along the subarachnoid space. This is an important fixed area, preventing the nerve from being displaced either way when pulled upon.

In the orbit the nerve may be inflamed along with the other tissues in an orbital cellulitis; it may be implicated through rheumatic or other affections of its sheaths; may be injured in orbital wounds, or may undergo atrophy from pressure exerted upon it by tumors or by hemorrhage into the inter-vaginal space surrounding it. At its termination in the papilla, the nerve may suffer in a peri-papillitic chorioidal atrophy by a cutting-off of the main part of its local blood supply, or may become affected by a continued supernormal intra-ocular tension. In its passage through the scleral aperture, the nerve fibres are liable to strangulation by the tight meshwork of the lamina cribrosa; this may occur in any form of swelling of the nerve trunk, or in an altered thickened state of the fibrous tissue framework.

- 5. The optic nerve fibres may degenerate secondary to destruction or impaired nutrition of their ganglion cells in the retina.
 - (a) These ganglion cells may suffer (a) along with other retinal structures in atrophy of the retina following total embolism or thrombosis of the arteria centralis; in pigmentary degeneration of the retina—primary or secondary; or in retinal detachment.
 - (b) In some forms of poisoning, as e. g., from nicotine and bisulphide of carbon.
 - (c) From an inherited neuropathy. Under this heading may be included the changes in amaurotic family idiocy, cerebral diplegia and possibly Gowers's so-called abiotrophy.
- 6. The optic nerve may suffer from an extension of an ocular inflammation.
- 7. Lastly, the optic nerve may, like other parts of the body, suffer from a general influence produced by serious disease, as e. g., in renal disease, syphilis, tuberculosis, severe anemia, and rarely in acute febrile diseases.

I can claim no absolute completeness in this classification of optic nerve affections, but I trust it will serve to indicate shortly the different ways in which this nerve may be involved. Thus it may suffer from inflammation, from non-inflammatory pressure, from degeneration of its nutrient ganglion cells, or from primary degeneration of its fibres.

I now desire to remark more fully upon one or two of these headings. In the first place then, we shall consider the evidences of the optic nerve suffering as part of the central nervous system.

In connection with a late stage of syphilis we may meet with atrophic changes, sometimes in the posterior roots of the spinal cord (spreading thence to the posterior columns), sometimes in the fibres of the optic nerves, occasionally in both together.

In the spinal cord the tabetic degeneration seems to be selective, and the reflex collaterals are first affected, while in more advanced cases the other fibers of the posterior columns also become degenerated. In the optic nerve we likewise recognize different kinds of fibers, at least two-namely, those forming part of the visual path, and those conducting the stimulus which excites the reflex contraction of the pupil. Now, loss of this light-reflex (the Argyll-Robertson phenomenon) is one of the earliest and most common of the symptoms of this kind of late syphilitic poisoning, though the actual fibers degenerated, whether in the nerve itself or in some possible connection between the nerve-roots and the third nerve nucleus, have not vet been recognized. As I have suggested elsewhere, there seems to be good reason for regarding these reflex fibres as probably collaterals from the visual fibres, and it is certainly suggestive that the first fibres, it may be, in mild stationary cases, the only fibres affected, are seemingly of very similar character in the optic nerve and spinal cord, being, I believe, reflex collaterals in both instances.

There are several anatomical analogies between the optic nerves and the posterior spinal roots, in the disposition of their sheaths and in their minute structure, and it is not unreasonable to regard the ganglion of the root as performing a similar function as, though not strictly homologous with, the ganglion retinæ. It has been asserted, but by no means proved, that the chief incidence of the post-syphilitic toxin is on the ganglion cells of the posterior root ganglion; should this be so, it would be reasonable to assume that the ganglion retinæ is likewise first affected in the visual path, and that the fibre-degeneration is secondary. Have we, then, any knowledge of the ganglion retinæ being primarily affected in any other form of optic nerve lesion? It is probable that in tobacco amblyopia the retinal ganglion cells are primarily involved, and they certainly are so in amaurotic family idiocy. Now, in these affections, where the retinal ganglion cells are presumably first diseased, the pupillary fibres escape, at all events so far escape that there is not an early interference with the pu-

^{1.} Trans. Ophth. Soc., vol. xx, p. 36.

pillary light-reflex. So much is this the case in tobacco amblyopia, that, in my experience, one of the diagnostic features distinguishing it from a retro-ocular neuritis, where the visual failure is similar, is the amount of pupillary reaction that exists in the presence of even great visual loss. There is also at least a fair pupillary reflex in amaurotic family idiocy. Again, in tabetic amblyopia, it is not uncommon to have central vision retained while the rest of the field is lost (tubal vision), while in the tobacco (toxic) form exactly the opposite occurs.

So far then as the optic nerve failure throws any light upon the primary seat of the disease in tabes, it presents arguments, derived from the behavior both of the visual and pupillary fibres, against the ganglion cells being the part of the neuron first affected. Here I would remark that the order of failure of the visual fibres in the optic nerve in tabes is also contrary to what ought to obtain if any so-called "compensation theory" afforded the explanation. According to Edinger's Ersatztheorie, the parts most subjected to continuous strain are the first to fail, and of all the visual fibres we should therefore expect those associated with central vision to become first, not last, affected.

An inflammatory origin has also been suggested in this disease, and the fibre atrophy has been regarded as secondary. Let us consider whether or not the optic nerve changes support this sug-Optic neuritis has very rarely been observed in tabes, but when present and when its origin could be ascertained, it has, according to Gowers, been found to be due to coincident syphilitic processes in the brain, e. g., chronic syphilitic meningitis. the great majority of cases there are no ophthalmoscopic signs of an early inflammatory process. On the other hand, in the late stages of the atrophy, we not uncommonly see that the lamina cribrosa is veiled by a thin layer of newly formed tissue, and histologically a considerable increase in the interstitial connective tissue has been found. We are, therefore, justified, I think, in sharing the belief commonly held now by neuropathologists, that any evidences of chronic inflammation present in tabes are late in development, and constitute a secondary result of a preceding parenchymatous degeneration.

The essential character of the affection of the central nervous system in tabes seems to be progressive alteration in, and removal of, the myelin sheath, ending in destruction of the nerve fibre. How these changes are originated is still a matter of conjecture, though

A Contribution to the Study of Amaurotic Family Idiocy, by F. J. Poynton, J. H. Parsons, Gordon Holmes. Brain, 1906, p. 180.

the consensus of opinion is in favor of a process of subtle poisoning due directly or indirectly, to a product of the micro-organisms of syphilitic infection. In his recent Lumleian Lectures, Professor Ferrier suggests, as a working hypothesis, that "the syphilitic virus in certain conditions so affects some viscus or gland that in time it develops and continues to elaborate some toxic internal secretion which exerts its noxious influence on the nervous system."2, 3

As further examples of the optic nerves being implicated along with other parts of the central nervous system, I may instance general paralysis of the insane, insular sclerosis, and certain blood states in which there have been found coincidently optic neuritis and myelitis. There are also the cases of ergotism, pellagra, and beri-beri, where changes may occur in the optic nerves coincidently with other changes of an allied character in the brain and spinal cord, together or separately, due to the action of a vegetable poison.

While the optic nerves are undoubtedly sometimes affected in such diseases, we must view with caution any diagnosis of this affection being secondary to disease of the central nervous system proper, and must first, in any case of this nature decide whether it is not more likely that both have suffered as parts of the central nervous system from the same general cause. As an instance of a possible fallacy of this kind, I would mention the rare coincidence of optic neuritis and myelitis. While not overlooking the possibility of myelitis being rarely communicated to the base of the brain and optic nerves, it has been very rightly argued that in cases where no such transmission can be proved there is a strong probability of both affections being the result of the same altered blood state.

As regards insular sclerosis, it will be of interest to consider how far the optic nerve changes and the symptoms produced correspond with those developed elsewhere, and whether our knowledge is in accordance with current views of the pathology of this obscure disease. We are indebted to Dr. Buzzard for having drawn attention to the fact that retro-ocular neuritis is a common event in patients who have at the same time, or who subsequently develop. symptoms of insular sclerosis in the central nervous system proper.

These cases are now well recognized, and the affection of the optic nerve has rightly been ascribed to an island of the disease being formed somewhere in its course. They generally behave like any other form of retro-ocular neuritis, that is to say, they show rapid failure of vision, with central or paracentral color-scotoma, fol-

^{2.} The Occurrence of Optic Neuritis in Lesions of the Spinal Cord, by James Taylor and Jas. S. Collier, Brain, 1901, p. 532.
3. On Nervous Symptoms of Morbid Changes in the Spinal Cord in Certain Cases of Profound Anemia, by James Taylor, Trans. Medico-Chirurgical Society. vol. lxxviii (1895).



Fig. 4.—Normal optic nerve entrance.

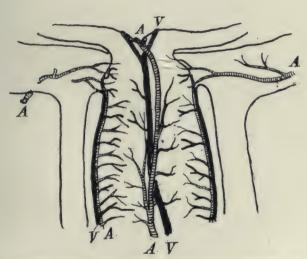


Fig. 5.—Diagrammatic section through optic nerve entrance showing distended intersheath space and vascular supply.



lowed by recovery of vision often nearly complete, but with persistence of some optic disc pallor. One nerve alone may be affected and once only, but there is a tendency to recurrences, and to both nerves being sooner or later seriously involved. Similarly, insular sclerosis occasionally attacks the central nervous system once or it may be twice only, and then becomes arrested with restitution of functions, though it is usual for it to progress.

Again, pallor of the optic disc with central scotoma may sometimes occur gradually, and progress very slowly to great visual loss, though never causing complete blindness, but without tendency to recovery, in insular sclerosis retro-ocular cases, and there is a similar slowly progressive variety of central insular sclerosis.

Both in sections of the affected optic nerve and in patches of this disease elsewhere, the leading anatomical change is a degeneration of the myelin sheaths of the nerve fibres, occurring in patches or islands in different parts of the central nervous system, associated with a hyperplasia of the neuroglia.

In the optic nerve cases actual papillitis is not infrequently present at first, along with localized pain on moving the eyeball, or on pressing it firmly back against the nerve-head. It has been assumed by many pathologists that the initial change is a parenchymatous degeneration, and that the increase of connective tissue is entirely secondary; such ocular manifestations of the disease as those just mentioned militate against this view. It is possible, even probable, that in some patches there is a rapid change worthy of being called inflammatory, while in others the process is a more gradual, simple, degenerative one.

Some of the visual symptoms support the view of an early, though probably secondary, myelin change, and here I may be allowed to quote from what I have said elsewhere. The visual acuity is less in a very bright light, and exposure to an excessive light may lead to a deterioration of vision that lasts for some time. Thus a patient says, "I cannot see these letters, they are too near the light." Or, "I cannot see so well to-day because the sun was so bright as I came along." This is presumably the result of an increased physiological degeneration, such as normally occurs, but in the case of ill-nourished axis-cylinders the process of regeneration is imperfect, and the conducting function remains impaired until this recovery has had time to occur.

Not infrequently complaint is made of seeing objects as through a moving haze, like that seen near the ground on a sunny day. One patient with vision reduced to 6/60 graphically described what is probably a higher degree of the same visual state, when she said:

"Things look jumpy, like figures in a cinematograph." This may be explained by imperfect insulation of the axis-cylinders in consequence of the myelin degeneration. Or it may be that this shimmering effect is due to the fact that the impoverished axis-cylinders, though able to conduct momentarily, are rapidly exhausted; the alternate action and loss of function of contiguous fibres, as they are earlier or later exhausted, may thus lead to confused perception, and to an apparent movement, from irregularity in the transmission and central perception of the visual stimuli.

On the other hand, the light-sense is defective. While too strong a light confuses, it must be strong enough to excite a stimulus that will be conducted along an impoverished fibre. In health the light-difference appreciation is directly dependent upon the amount of retinal stimulus, but here another factor comes into play, namely, the conducting power of the individual nerve fibres along which the stimuli are transmitted.

Another clinical phenomenon in these cases is the presence of a complete or relative scotoma for color at or near the fixation point. Of the two sensations, light and light sensation persists with the smaller recognizable stimulus, but this varies in different parts of the spectrum. In the case of the longest visible waves, the red, they become recognizable as a color practically at the same time as they become visible as light, and are deficient in brightness, so that their power to stimulate sufficiently to be conducted along defective fibres is lost early, and a red object looks black from giving no visual sensation. In the case of the brightest waves (those lying in the green), there is a marked interval between the intensity necessary for the perception of light, and that necessary for the recognition of color. In defective fibre-conduction the color appreciation fails while that for light persists, so that in such cases the green object appears white or gray. Hence these two colors, red and green, green particularly, constitute our most valuable clinical tests in the early recognition of loss of conduction.

These instances of the subjective visual symptoms in retroocular insular sclerosis indicate an impaired conduction along the nerve fibre. The fact that recovery of vision so frequently occurs favors the view that this impaired conduction is at first due to pressure from a local edema or inflammatory effusion, not from a slowly progressive thickening of the interstitial tissue.

The etiology of insular sclerosis is obscure, and it is interesting to observe that the same causes said to be operative here, have also been adduced in the case of primary retro-ocular neuritis. It is more than possible, it is likely, that many cases of primary retroocular neuritis are early local developments of insular sclerosis; if watched for some years a considerable proportion of these develop general symptoms later. Similar cases, where the optic nerves remain alone affected, may consequently be of a similar character, just as, in a late syphilitic affection, the optic nerves may atrophy without the spinal cord being involved. Insular sclerosis, in fact, affords another instance of the central nervous system being affected in one or more than one of its parts, presumably by a toxin, the derivation and nature of which, however, remain here unknown.

I shall now, with your permission, pass on to the consideration of the second class of optic nerve affections, where these nerves are involved as a result of their anatomical relation to the contents of the intracranial cavity.

Regarding the relation of optic neuritis to tumors of the brain, much has been written, and several theories have been advanced to explain the occurrence, but the subject remains to-day very much where von Graefe left it nearly fifty years ago. He first advanced the theory that increased intra-cranial pressure is caused by an intra-cranial tumor, and that this increased pressure disturbs the circulation in connection with the eye, with the result that we get swelling of the papilla with venous distension and hemorrhage. To this condition he applied the term "stauungs-papilla," or in English "choked disc," to distinguish it from other forms of papillitis in which inflammatory changes seemed to descend the nerve from the meninges. This view of von Graefe's I still regard as practically correct. Unfortunately, von Graefe went further in attributing the disturbed intraocular circulation within the eve to compression of the cavernous sinus by the high intracranial pressure. When it was demonstrated by Sesemann that such an effect of pressure on the cavernous sinus was very transient, on account of a free communication between the orbital and facial veins affording abundant relief, and when cases were produced of obliteration of the cavernous sinus from other causes without any effect being produced upon the retinal veins, belief in the mechanical theory was shaken. The important fact that the intermeningeal spaces around the brain were directly continuous with the intervaginal spaces of the optic nerve, first demonstrated in 1869 by Schwalbe, was naturally regarded as significant, in so far as distension of the nerve-sheath had been found in some cases of optic neuritis from cerebral tumor. Schmidt-Rimpler argued therefore that, in raised intracranial pressure, the fluid, driven out of the cranial cavity so as to distend the nerve-sheath, passes into the lymph spaces of the

nerve itself at the lamina cribrosa, and so produces optic neuritis, possibly by its irritant quality. Manz accepted the fundamental facts of this mechanism, and showed how frequent, if not invariable, was this sheath-distension in cases of increased intracranial tension, but argued that simple pressure of the fluid on the nerve and central retinal vessels caused the papillitis. This remains the position of the purely mechanical theory.

Next we have what may be termed the "foreign irritation" or reflex inflammation theory. Hughlings Jackson suggested in 1863 that an intracranial tumor causes optic neuritis by acting as an irritating foreign body, liable to set up nutritive changes which spread, it is most probable, not along nerve fibres, but along the connective tissue of blood vessels in arterial regions—possibly in vaso-motor regions. This view was shared by Brown-Séquard, and still later by Benedikt, who assumed that the tumor acted as a source of irritation, which produced a reflex influence through the vaso-motor nerves upon the papilla, thus leading to its inflammation. A similar "reflex" explanation has been more recently supported by Loring.

Thirdly, we have the "direct inflammation theory." According to some a basil meningitis, often very slight, is transmitted along the optic nerve-sheath, and affects the substance of the nerve trunk and so reaches the papilla; this view is supported by Galezowski, Edmunds and Lawford, and others. Leber, on the other hand, holds that the fluid in the distended nerve-sheath conveys to the optic nerve irritative pathogenic material present in the cerebrospinal fluid in various intracranial conditions. Strong evidence in favor of Leber's view has been adduced by Elschnig and Deutschmann.

Finally, we have the "direct edema" theory. According to Parinaud, the distension of the cerebral ventricles, which is present in cases of cerebral tumor, causes a general cerebral edema, of which the papillitis and sheath-distension are merely and equally local peripheral manifestations. Kampherstein, on the other hand, contends that the edema, met with in the brain substance immediately surrounding a new growth, spreads through the brain tissue and into its continuation, the optic nerve.

You will thus understand that it needs some courage to step into such a well-trodden arena as this. The field is notoriously slippery, there are occasional pitfalls, too, and false lights play upon what appears to be a path across to the gateway of knowledge. But, from what must be considered a tumor, I have naturally been led to hold certain views of the rela-



Fig. 6.—Longitudinal section through optic nerve in a case of recent papillitis. There had been symptoms of cerebral glioma for eighteen months, but the papillitis only appeared five days before death.



Fig. 7.—Transverse section through nerve. Same as Figure 6.



Fig. 8.—Suppurative meningitis—gross papillitis.



tionship as being more reasonable than others, and a man must try and find reasons for the faith that is in him. Let us consider then how far the clinical facts of papillitis in brain tumor are satisfactorily explained by, and compatible with, these theories of its production.

If any theory of direct transmission be correct, whether it be of an inflammation along the sheaths, or of an edema along the nervetrunk, we should expect to have evidence of pressure upon the nerve fibres—some interference with their conduction—before the occurrence of papillitis. This pressure is particularly liable to affect the nerve fibers while in the optic canal, and while passing through the scleral aperture. In fact, a descending neuritis or descending edema is necessarily a retro-ocular neuritis or edema in its earlier course.

If obstructed flow in the central vein be the initial occurrence and the local exciting cause in papillitis, we should have ophthalmoscopic evidence of this at the very beginning of the process.

Exponents of the "reflex inflammation" theory may be asked to produce evidence of a similar mechanism elsewhere in the body, and to explain how it is that there is no clinical manifestation of this vaso-motor disturbance in any part of the nerve except at its intraocular end.

Leber's view is undoubtedly plausible, but it would be satisfactory to have some definite proof of the presence of this pathogenic material and of its mode of origin, and an explanation of the rapid subsidence of a papillitis, produced in this way, on relief of the high intracranial pressure.

(A.) The earliest ophthalmoscopic signs of papillitis are increased redness of the disc, with slight prominence of its surface, narrowing of the physiological pit, and loss of definition in its edges. At a rate which varies much in different cases, and which seems to bear a decided relation to the degree of intracranial tension (as evidenced by headache and sickness), the swelling of the papilla increases, the physiological pit disappears, and the discedges become quite obscured; along with these signs there is now haze of the adjoining retina, and the retinal veins begin to show evidence of the circulation being retarded. In an advancing case, the next alteration consists in further swelling of the papilla, so that it becomes both more prominent and occupies a larger fundusarea, and the venous distension is now very marked; fine folds not infrequently appear in the edematous retina, particularly between the disc and macula, and there may be retinal hemorrhages, Ultimately the papilla becomes more opaque, and sometimes more prominent, the hemorrhages increase in size and numbers and there are inflammatory exudations on the disc and surrounding retina. In this account you will observe that I have not found, and do not regard, distension of the central vein as among the earliest ophthalmoscopic signs.

- (B.) With intense papillitis, perfect central vision may be retained. When visual failure does occur, it usually at first takes the form of a peripheral or sectorial defect, with comparatively slight central loss. In tumor-papillitis I have never met with any preceding central visual failure indicative of pressure on the optic nerve fibres behind the papilla.
- (C.) There may be complete recovery from a gross papillitis, with retention of perfect vision throughout the affection, and with the restoration of a disc ophthalmoscopically normal. Such a result is not infrequently obtained by the surgical relief of high intracranial pressure. As might be anticipated, the subsidence of swelling does not take place immediately upon relief of the tension. In the days when trephining and opening of the dura were performed at the same operation, I have kept the disc under observation during one or two operations performed by my colleague Sir Victor Horsley, but found no change in the prominence as the operation progressed. This, as might be expected, occurs later. rule the subsidence begins to be evident about the fourth day after opening of the dura, and then proceeds gradually but fairly rapidly, even one day sometimes producing a decided fall in level. And here, gentlemen, I should like to make a remark that I trust may be taken in good part. It seems to me, as one of what must be reckoned the older school of ophthalmologists, that too little attention is paid by some among our brethren of the rising generation to the accurate estimation of differences in funduslevel. In detecting errors of refraction retinoscopy is a most useful aid, but forms a miserable substitute for direct ophthalmoscopic examination. The difficulties of the latter method have been much exaggerated, but even if they exist, the time spent and the experience gained is, in my opinion, of constant utility, particularly in the medical aspects of our work. In such cases as we are now considering the prognosis, general as well as visual, and the question of the desirability of surgical interference, are often largely based upon or influenced by the increase or diminution of the prominence of the papilla. Verbum sat sapienti.
- (D.) There seems to be a connection between the liability to papillitis in brain-tumor and the form of the eyeball. In the great majority of cases of tumor-papillitis that I have seen, and the total

number now exceeds nine hundred, the eves have been hypermetropic, usually decidedly so, while the coincidence of this affection with myopia, even of low degree, has been very rare. In an experience confined to England there is manifestly the fallacy that among our population hypermetropia is relatively more common than myopia. At the same time we have many myopes.* To eliminate this fallacy of population as far as possible, however, I have recently communicated with Professors Fuchs and Hirschberg, and their experience in Austria and Northern Germany, where myopia is certainly much more common than in England, seems to corroborate what I have said. What I was not prepared for in their replies is that high myopia is a comparatively rare condition in these countries, so that the association of brain tumor and high myopia becomes of very low probability. Of 19 cases of choked disc quoted by Hirschberg where the refraction was ascertained. 8 were emmetropic, 10 hypermetropic, and 1 myopic-certainly a striking enough percentage in a Berlin clinic. Again, a good many years ago, Gowers concluded, from clinical experience, that the hypermetropic eve was predisposed to papilla-congestion. If we examine longitudinal sections through the optic nerve-entrance in myopic eyes, we find a peculiarity in the termination of the intervaginal space which very possibly explains this difference in clinical behavior. The most common mode of ending of the space in the hypermetropic and emmetropic eve is depicted on the screen. It will be seen that it ends abruptly on about a level with the middle of the scleral aperture, and that its termination is somewhat sharp and directed towards the optic nerve-trunk. In myopic eyes, on the other hand, the dural sheath quits the nerve earlier, and the intervaginal space is continued for some distance in the substance of the sclera away from the nerve trunk. Pressure from a distended sheath-space-ending would compromise the optic nerve comparatively early in the one case, while in the other (the myopic) the pressure would be directed in great measure away from the nerve, and this pressure might be relieved by filtration of the fluid through the sclera before it could interfere with the nutrition of the nerve. I also show a slide from a figure given by Donders, showing how very early the dural sheath may leave the nerve trunk. and how thin it may become, in a case of high myopia with posterior staphyloma all round the optic disc.

^{*} Unfortunately I have no record of how often myopia was present in cases of cerebral tumor; I can only say that very few indeed of the total number had papillitis.

As to the manner in which the optic nerve will first be influenced by this local pressure from without, we must first realize (what a section can merely indicate) that it is exerted all around the optic nerve entrance, and bears directly upon the pial sheath surrounding the nerve. Now, in this pial sheath travel the veins that serve in large measure to return the blood that has circulated in the papilla. This blood, as you know, is derived partly from the short posterior ciliary arteries, partly from the small arteries of the pial sheath, and from minute branches of the arteria centralis, but there are no corresponding posterior-ciliary veins, so that, as I have said, the pial veins bear a relatively important part in the return flow. Obstruction, then, of these pial veins will cause hyperemia, with secondary edema of the papilla. The axis cylinders here are comparatively loosely arranged, and consequently do not suffer readily in their conduction power from an amount of edema that, in the nerve trunk, would cause visual failure.

Clinically, then, we have in connection with high intracranial pressure, a swelling of the intraocular end of the nerve, accompanied by distension of its small vessels; the edema, simple at first, leading later if unrelieved to signs of inflammation; the vena centralis not engorged in the earliest stage; no visual failure such as we should expect in a descending or retro-ocular affection of the nerve, either inflammatory or edematous; disappearance of the papilla—edema, without visual failure, on early removal of the high intracranial pressure.

Anatomically we have in these cases distension of the cerebral ventricles; escape of fluid into the subarachnoid space of the brain and spinal cord; a fluid distension of the inter-vaginal space round the optic nerve, particularly apparent at its termination, where the form of the distension is different according to whether or not the usual myopic disposition of the dural sheath obtains; a simple edema of the papilla in early cases, separating and displacing, but not causing actual danger to the nerve-fibre bundles; and no evidence of the presence of pathogenic material in the inter-sheath fluid. A hypernucleation of the sheath may readily be explained by the presence in excess of a fluid that is not pathogenic, and an edema of the nerve trunk may well be subsequent to the papillary change, and not necessarily an extension of the edema which occurs around the new growth.

I contend then, that, whether the result of direct filtration of fluid from the end of the intravaginal space through the pial sheath, or, as I have here suggested, a consequence of pressure on the pial veins, the first effect produced upon the papilla is in the form of

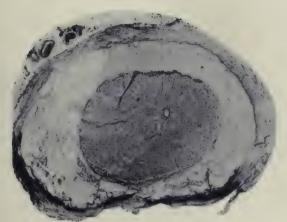


Fig. 9.—Meningitis and papillitis.

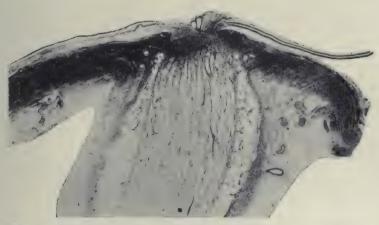


Fig. 10.—Right parietal glioma. Neuritis and macula figure. Late after operation. Meningitis.



a pure edema. In proof of this contention I would adduce the usual absence of early visual loss; the comparatively frequent subsidence of the papillitis on removal of its proximal cause, without visible or visual effects being left behind; and the fact that there is nothing histologically abnormal in the swollen papilla at this stage beyond an edema. The slide here shown exhibits such a condition. The papillitis only appeared five days before death, in a patient who died from cerebral glioma with symptoms of eighteen months' duration.

That venous congestion is a cause of tissue-edema is a clinical fact of common observation. "The fluid exudes from the capillaries and small veins on the distal side of the cause of venous obstruction, and shows itself first where the pressure is greatest." Besides this edema, venous hyperemia causes a lowering of the general nutrition of the part, shown by an increased tendency to inflammation. In a severe acute venous congestion hemorrhages occur in the tissue, either from diapedesis or from actual rupture; while, on the other hand, in chronic venous congestion, an hypertrophy of certain kinds of tissue is the result.

How the edema is produced is still a subject of controversy. Not long ago it was taught that the edema was produced by the escape through the venous walls of the more fluid parts of the contained blood, by a process of filtration under pressure. According to modern pathologists the process is not simple, but is either produced by a change in the relationship of the blood to the altered vessel-wall, or by a lowered nutrition of the tissues followed by arterial hyperemia and increased output of lymph from the blood vessels. There is no need to go further into this question here. Edema is in some way produced as a result of venous hyperemia, and both the venous congestion and the edema are capable of producing changes in the tissue affected, rendering it of lowered vitality, and more liable to inflammation and to the escape of red blood cells.

It is of interest to note that degeneration of the posterior columns of the spinal cord⁵ frequently occurs in cases of intracranial tumor, and that it is of root-origin, commencing at the point where the posterior roots enter the cord. It has been stated that this degeneration is the result of changes produced in the posterior roots by the distension of the arachnoid owing to increased intracranial pressure. It would be important to know if this change

^{4.} Lazarus-Barlow, Man. of General Pathology, p. 213.

^{5.} Spinal Cord Changes in Cases of Cerebral Tumors, by F. E. Batten and Jas. S. Collier, Brain, 1899, p. 473.

consists of a simple degeneration from pressure of the subarachnoid fluid, or of an atrophy of fibres consecutive to a preceding neuritis. In any case, the occurrence affords a striking analogy as regards effect and anatomical features with what obtains in the optic nerve under similar conditions.

I fear, gentlemen, that I have long exhausted your patience, though not your courtesy. Had time permitted I should have liked to have said a few words on the occurrence of one-sided papillitis in intracranial tumor, but there is not much to add to what I have expressed elsewhere on this subject.⁸

I must, however, make a few remarks regarding my seventh class of optic nerve affections, viz., where these nerves suffer from a general influence produced by serious disease. In connection with renal disease, for example, we may have a simple papillitis, or more commonly a papillo-retinitis. Whether in the papilla, or in the retina, or in both, the most evident first change is an edema. The causation of this edema is usually quite obscure. In some instances, it undoubtedly takes place in a more or less mechanical way. A sclerosed artery, with greatly thickened coats, impedes the circulation in a vein where it crosses over it, and the circulationarea of the vein on the distal side of the obstruction becomes first edematous, and later partly occupied by hemorrhages. This succession of events can be followed clinically in the retina, and it is justifiable to assume that a similar physical explanation sometimes holds good further back, in the nerve itself, so as to cause edema of the papilla and of the entire retina. But, in the absence of visible arterial changes of this nature, we must believe there is some other agency at work. Now the whole question of the occurrence of tissue-edema in connection with renal disease remains obscure. It is certainly not merely a question of escape of fluid into the tissues in consequence of faulty renal excretion; thus we may have kidney disease with total suppression of urine and no edema. Again, in some very rare cases of acute nephritis, there is great edema and a normal quantity of urine passed per diem. Indeed there is seemingly no real causal connection between renal disease and tissueedema, both are probably due to one general cause operating through the blood supply, causing renal changes in one locality and causing edema in other situations. The ultimate cause may be an altered relation between the blood-state and the vessel-walls, occasioning possibly, directly or indirectly, a lowered nutritive state of the surrounding tissues, and so by a combined chemico-vital process producing an edema. This seems to explain how it is that we sometimes, in the absence of renal disease, get similar fundus-changes

produced in anemia. We must not, in fact, regard any form of fundus lesion as the *direct* effect of renal disease, but as the result of an altered state of the blood, or of the vessel wall, probably of both. In this way we find linked the papillo-retinitis of renal disease, of obscure anemia, and of the blood changes produced by great loss of blood and as a result of febrile disease. And we have already noted that similar fundus-lesions, e. g., papillitis, with retinal edema and macular stellate figure, can be the result of a local edema produced in quite another way, in cases of intracranial tumors.

Gentlemen, the field is wide, many observations are required and much work remains to be done. We must analyze our facts carefully, and generalise from them most cautiously. Skilled labor in our department is what we want, and it is my belief that your great country is to show the world what can be done in this as in other departments of applied knowledge.

I have to acknowledge my indebtedness to Mr. Leslie Paton for the microscopical sections showing pathological changes in optic neuritis, and to Mr. George Coats for kindly having these sections photographed and prepared as lantern slides. My thanks are also due to Mr. Paton for notes on the cases thus illustrated.

OBSTRUCTIVE DISEASE OF THE RETINAL VESSELS.

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PHILADELPHIA.

We see and read much in this day and generation of obstructive disease of the retinal vessels-whether because of more acute observation or of greater frequency of the condition (or both causes combined) it were difficult to say. One fact stands out, however, Arteriosclerosis, which is the starting point of most all disease of the retinal vessels, is a very much commoner clinical picture than it was twenty-five years ago. It has advanced from the position of a senile manifestation and a necessary accompaniment of old age to one of the commonest sequences of the strenuous, disordered life. One of the best definitions of it we have seen is that of Collins,1 who speaks of it as "a general disease with predilection for certain localities." Obstructive disease of the retinal vessels may range from a low-grade endarteritis through high-grade endarteritis to partial or even complete thrombosis or embolism. It may appear at almost any decade, the period of middle life and thereafter offering the most favorable soil for its development.

Frost, in his Atlas, gives the following as among the chief ophthalmoscopic appearances due directly or indirectly to changes in the retinal circulation: alterations in the width of the blood column, in the shape of the vessel, in the breadth and brilliancy of the light streak, changes in the color of the blood, visible or even opaque vessel walls and lymph sheaths, small retinal hemorrhages, and, lastly, the group of symptoms associated with blocking of one of the main retinal vessels.

Alleman² arranges these vascular cases in four groups:

- 1. In the first group no organic lesion is discoverable, the important finding being a tortuosity of the smaller retinal vessels and of their terminal twigs.
- 2. In this group there is added more or less bending of the vessels at the crossings.
- 3. In this group some evidence of organic change in the vascular walls can be made out. Pressure phenomena are more pronounced,

^{1.} New York Med. Journal, June 6, 1906.

[†] In Alleman's 40 cases 15 were 30 years of age and under.

^{2.} Amer. Medicine, vol. vii.

also obscuration of the under by the overlying vessels. Miliary hemorrhages may at times be seen.

4. In this group are included all cases presenting advanced vascular disease, such as hemorrhagic, diabetic and albuminuric retinitis, falling into three types: a. The hemorrhage. b. The degenerative. 3. The active inflammatory.

Marcus Gunn³ classifies the changes as:

1. Alterations in the course, caliber, size and breadth of the retinal arteries, tortuosity and bending of the vessels being prominent signs.

2. Alterations in the reflections and translucency of the walls of the retinal arteries manifesting themselves in increased disturbance of the central light streak, loss of vessel translucency with the formation of whitish stripes showing degeneration of the walls or perivasculitis (silver wire artery).

3. Alterations in the course, caliber, size and breadth of the retinal veins exactly as they occur in the arteries, with the addition of indentation of the vein when crossed by an artery.

To these signs de Schweinitz⁴ adds as among the very earliest signs of arteriosclerosis (even before the stiffening of the arteries and veins occurs) the occurrence of fine corkscrew tortuosity of the small macular vessels and a curious brick-red congestion of the nerve head.

It is now almost an axiom that "whether the fault is primarily in the nervous system or whether the disturbance of nutrition is brought about by the presence in the circulating medium of abnormal and irritating elements, when an autotoxemia is once established, it is self-perpetuating, and unless arrested will sooner or later bring about organic changes in the tissues."

In Alleman's 40 cases, the one constant abnormality, the condition he always found in association with retinovascular anomalies, was some disturbance of metabolism, evidenced in the vast majority of cases by diminution in the elimination of urea.

According to Parsons,⁵ primary arteriosclerosis as a part of a general arteriosclerosis is not uncommon in the retina. Only very small vessels are involved, so that the grosser changes in the media and adventitia which occur in the larger vessels of the body, do not come under discussion. The process, which is a chronic inflammatory one, is characterized in all small vessels by proliferation of the endothelium of the intima and new formation of connective tissue, especially elastic fibers (Reimar, v. Michel, Hertel, Raehlmann and

^{3.} Ophthalmic Review, 1898.

Proc. Phila. County Med. Society, vol. xxvi.
 The Pathology of the Eye, vol. ii.

others). According to Hertel, a constant richness in elastic fibers is the essential histologic feature, but it must be borne in mind that a gradual increase in the elastic tissue is a continuous process, which commences in the newborn and goes on throughout life, whether true angiosclerosis intervenes or not. It is the regularity both in distribution and type of the tissue which is indicative of disease. In other words, the essential lesion in arteriosclerosis is a proliferative (and what may finally become an obliterating) endarteritis and to a less degree endophlebitis.

In the "silver-wire" arteries Hertel⁶ found endovascular changes more marked in the arteries and perivascular changes the more marked in the veins. Parsons is of the same mind as Alleman that these conditions are probably due to chronic toxic irritation, but are not inconsistent with normal vision and absence of ophthalmoscopic signs. Indeed, the functions of the retina may remain unimpaired for a prolonged period.

There is a well-defined group of symptoms associated with, and in a large measure dependent on, that variety of chronic contracted kidney which results from a gradual progressive sclerosis of the blood vessels of that organ and reveals itself in greater or less vascular change all over the body. The following cases are in point:

Case 1.—A. G. B., age 48, a prosperous broker, was referred to me in June, 1904, by his medical adviser, who stated that there was evidence, after many careful urinalyses, of low-grade organic renal disease. He wished to know whether there were any ophthalmoscopic signs of such disorder. The eye grounds revealed no other lesion than well-marked pressure at the crossings in the periphery of both eye grounds, with some tortuosity in the veins and one or two supernumerary, much twisted, macular arteries on the disc. The nerve heads were of fair hue and outline, the fundi evidenced no other lesion whatever. The patient was cautioned as to his contion and has since, by an exemplary life, remained a well, active, busy man.

Case 2.—A married woman of 35, who from her twentieth to her thirtieth year lived to the flesh with all her might and main. In the last five years she has tried to make amends for her previous errors of life, but has come off with a badly shattered constitution. Her physician wrote that she had a persistent low-grade albuminuria with occasional tube casts, typical cardiac hypertrophy with fair compensation, occasional postural vertigo and some other signs of angiosclerosis. The ophthalmoscope showed only beginning sclerotic changes in the arteries without any inflammatory or degenera-

^{6.} Arch. Ophthæ, vol. lii, 1901.

tive changes whatever. Arrangements were made for pulse tracings and blood pressure estimates, but the patient's sudden removal to a distant city precluded any further following of the case.

CASE 3.—Concerns a married woman of 29, of fairly good health, who came for a change of glasses. She was wearing a low compound + sphere that had not much helped her headache, photophobia, vertigo and accommodative failure. Within four years she had borne three children, the youngest being now 18 months old. Up to eight months ago she was somewhat nervous, but otherwise in fine health. Since then she has lost 25 pounds in weight, probably because of acute domestic infelicity. The eves were normal anteriorly, the vision in each being 5/xii. The muscle balance was normal. The perimeter showed concentric contraction of both form and color fields, but no color inversions. With the ophthalmoscope both vitreous humors were seen to be full of fine, thready opacities. The nerve heads were fluffy of outline, especially nasally, and the chorioids and retinas congested throughout without anything wrong in the maculæ other than a rather granular condition. In both eyes, moreover, the arteries were a trifle uneven in caliber, somewhat lighter in color than they should have been, and indented the veins more or less wherever they crossed them. The latter were broader and more tortuous than normal. In each eve there were one or two very small, much twisted macular arteries.

The patient was referred to Dr. R. Max Goepp, who reported as follows: "The heart action is rapid, clear and forcible and without murmurs. The pulse is rapid and variable, averaging about 104. The rate is not increased by exertion. The blood pressure with Stanton's instrument is 128 mm. (systolic). The pulse tracing (pressure of 3 ounces) shows low tension, rapid pulse, somewhat irregular in time and volume. Sphygmogram No. 2 was taken immediately after No. 1 without rewinding the spring and in it you see the low tension characteristics intensified. Clinically it is impossible to diagnose arteriosclerosis in this case. The cardiovascular condition is one of neurosis without signs of structural change." The urinalysis (made by Dr. Duncan) showed a greenish-pale urine, of neutral reaction—sp. gr. of 1010—a very slight trace of albumin, no sugar, a small amount of indican, urea only 55 per cent. of what it should be, microscopically some squamous epithelium and a few leucocytes.

In this case, then, the only signs of beginning arteriosclerosis to be found anywhere were in the eye ground. If this state of affairs should show itself often, the value of the ophthalmoscope in the careful study of the eye ground for signs of oncoming arteriosclerosis could hardly be overestimated.

These three cases fall more in Alleman's second than in his third group. That is to say, that they more or less represent beginning arteriosclerosis—the stage in which much may be done for the patient. If the case has gone on to marked stiffening of the vessels with organic changes in the intima and perivascular spaces, it is doubtful whether treatment will effect sufficient change in the vessels to be of much avail.

TRANSIENT MONOCULAR BLINDNESS.

This phenomenon has given rise to much speculation, although it has been pretty generally ascribed to spasm of the retinal vessels. Four years ago Posey reported several such cases in which, after excluding all possible causes, it was decided that vascular spasm was the likeliest cause. Numerous reports of like cases have been brought together by Wagenmann,8 and by Posey,9 and Zentmayer,10 Frost¹¹ and others. Wagenmann, Benson, Sachs and Harbridge have each had the opportunity of studying actual spasm of the retinal vessels during the whole cycle of this phenomenon. It is to be regretted that more opportunity can not be had for studying these cases of transient blindness during the period of amaurosis from suspected spasm, as there is much uncertainty about the actual lesion—this, as Zentmayer says, "because of the long period of time which has usually elapsed between the time of the occurrence of obstruction and the necessity for enucleation from secondary causes." When death offers an opportunity there is always a question as to how much postmortem changes may lend even greater obscurity to the matter. A. H. Thompson (Ophthal. Review, 1902), makes the point that so long as the endothelium of an artery remains intact, healthy blood—even though it be stagnant—does not clot in it; it is only when the intima becomes disintegrated (as Parsons and others have shown) that this happens.

It is probable, as suggested by Priestly Smith,¹² that many cases diagnosed as embolism have really been instances of arterial thrombosis.¹³ A clot may form in the vessel owing to some roughness of its lining or it may occur during great retardation of the circulation from whatsoever cause—or possibly as the result of spasm of the arterial walls. The last would account for the transient attacks of blindness which frequently forerun the final catastrophe.

^{. 7.} Jour. A. M. A., 1902.

^{8.} Graefe's Archiv., vol. xliv.

^{9.} Loc. cit.

^{10.} Trans. Section on Ophthal. Amer. Med. Assn., 1906.

^{11.} Atlas of Ophthalmoscopy.

^{12.} Oph. Review, vol. iii.

^{13.} Harms has recently gone so far as to say that embolism, in the sense to which V. Graefe referred, does not occur.



Figure 1.



Thrombosis may be distinguished from embolism by a history of transient failure of sight, resembling the permanent attack in the mode of onset, and especially of simultaneous failure of the fellow eye at the moment of onset.

Recently one of my old patients returned to me in great alarm. She had been carefully refracted five years previously (when she was 60 years of age) and at that time nothing abnormal was noted in the fundi other than an unusual fluffiness of the nerve edges in both eyes. Her corrected vision was 5/iv in each eye at that time.

CASE 4.—Patient is a well-nourished, remarkably vigorous woman for her time of life, of only fairly full habit and uncommonly good life habits. She stated that twenty-four hours previously, while sitting quietly on the veranda in the evening, she noticed a "queer feeling" in her right eye and all of a sudden it became blind. This she proved to her own satisfaction by covering her left eye. As she had just asked her husband what time it was, she was afforded unusual opportunity to know the duration of the attack, which was 14 minutes. At the end of that time, the sight rather suddenly returned "exactly like a passing eclipse," according to her statement. On examination I found the corrected vision in both eyes to be 5/v. There was no anomaly of accommodation or muscle balance. The only complicating feature of the case was that she had been migrainous for years but she had never experienced anything like this seizure; and, as she is a woman of high intelligence, this statement on her part is probably trustworthy. The ophthalmoscope revealed a rather dusky nerve head in both eyes with-unmistakably indented veins in the region of the equator of the globe whenever crossed by arteries. There were no changes in the caliber or course of the arteries or veins and no perivasculitis or miliary hemorrhages. The visual fields were normal, tension also. The patient was interrogated as to any indiscretion in diet, or overactivity, or as to recent illness. or worry and all these factors were excluded. She stated, however, that she had recently been the victim of unaccountable lassitude and occasionally felt little twinges in her joints. Within the following two weeks she had three similar attacks, none for more than four or five minutes' duration.

The urinalysis (by Dr. Duncan) showed a pale urine of acid reaction, sp. gr. 1008, no sugar nor albumin, no indican. This last finding is a little surprising, as the urea equivalent is but 0.9 per cent. (as against the normal, 2 per cent.). Microscopically there were a few round epithelial cells, showing fatty changes, and some amorphous urates.

The patient was referred to Dr. W. B. Stanton for examination of her cardiovascular status, and his report follows: "Mrs. B.'s pulse is 64, regular, moderately full and well sustained, doubtful high tension pulse. The tracing I send shows a typical anacrotic notch and sustained falling wave. The first heart sound is distant and comparatively weak. The second is everywhere accented, especially at the aortic cartilage, where there is a faint systolic murmur. The radial vessels are unusually soft, considering the tension found. The blood pressure is 160 high (systolic) and 110 low (diastolic). Both of these levels are clear cut, which, to my mind, indicates that, in spite of the increased resistance, the heart is entirely sufficient to its task."

DIFFUSE SCLEROSIS.

An instance of aggravated widespread sclerosis of the retinal vessels and chorioidal circulation was the following:

CASE 5.-Mrs. E. O., aged 43, housewife, was admitted to my service at the German Hospital Feb. 21, 1906. Her vision at that time was R. ½/lx; L., 3/60. She stated that she had been wearing glasses for 15 years and that for the past 8 years there had been gradual loss of sight, more advanced on the right side. At no time had there been any pain or distressful subjective sensation about the eyes. The patient was a well-developed, well-nourished German woman of healthy appearance. She had measles and scarlet fever in childhood and typhoid when about 18. Was married at 23 and has borne 3 children, all living and in splendid health. Her father died of an accident; her mother is still living. At no time has she been the victim of any intense nervous strain or worry. For years she has been a small (one or two glasses) daily consumer of beer. No history or signs of specific infection could be made out. The ocular examination showed the lids, conjunctivæ, cornea and irides to be normal. The iris reactions were prompt, but not very full. The eyes were steady under cover and normal in their motions.

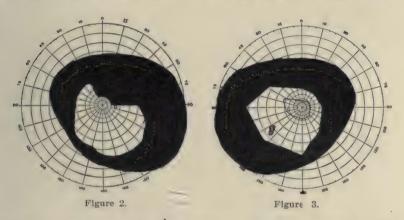
The ophthalmoscope showed, in the R. eye, clear media, disc oval at 30°, a sharp scleral ring all round, with knife-edge sharpness on the temporal side, where the vessels kink as they cross it. The pigment epithelium is practically completely absorbed so that the whole chorioidal circulation is plainly in view and shows evidence everywhere of high-grade sclerosis of the larger vessels. Their walls are white and are distinctly outlined against the darker background. There are no atrophic patches in the chorioid such as are pictured in Figure 75 in the Haab-de Schweinitz Hand Atlas. The retinal vessels, too, were implicated, showing alterations in caliber and size and course and pressure at the crossings. In the left eye the findings are practically identical. Dr. Mary Buchanan has pictured

this fundus also (Fig. 1). The visual fields in this case are shown in Figures 2 and 3.

Dr. R. Max Goepp, to whom she was referred for investigation of her vascular conditions, reported as follows:

"Heart.—Apex beat palpable in fifth space and nipple line which corresponds with midclavicular; upper border of cardiac dulness at third rib; right border two finger breadths to the right of the right border of the sternum. No visible pulsations at apex or in vessels of neck. The heart sounds are regular, 72 in the minute, and of good volume. The first sound at the mitral is 'rough;' the second aortic is distinctly accentuated at the second right cartilage and ringing at the third interspace on the left side; the second pulmonic is slightly accentuated. The lungs are normal.

Blood Pressure.—The radial pulses are found with difficulty, especially on the right side; the arteries are not palpable during



diastole. Temporal and other cutaneous vessels not palpable. The blood-pressure readings in the sitting posture: Left radial: systolic pressure, 126 mm.; diastolic pressure, 100 mm. Right radial: systolic pressure, 115 mm.; diastolic not obtainable.¹⁴

I do not attach any importance to the difference in the reading on the two sides, as I believe it is due to the excessively deep position of the right radial, making it practically impossible to obtain an accurate reading. On the other hand, the slight enlargement of the heart and the character of the second aortic sound indicate increased blood pressure. I conclude from my examination of the patient that she has increased arterial tension and general arteriosclerosis. Blood pressure estimates 3 months later: systolic, 131 mm.; diastolic, 94."

^{14.} Average blood-pressure between 120 and 160 millimeters of mercury (cystolic pressure).

The blood pressure findings by Dr. Goepp would place this case in Hare's¹⁵ class "3," of cases in which after a prolonged period of high tension, persistent low tension more or less suddenly develops in which the arteries are relaxed and distended and falls in with his contention that "it is quite as possible for vascular compensatory hypertrophy to rupture as for the cardiac compensatory hypertrophy to do so."

As to the treatment of this case: Under iodid of potassium in increasing doses, large doses of strychnia, subconjunctival injections of normal saline solutions, the patient's vision, after 4 months' treatment had risen to R. 3/lx, L. 5/xlv, although I was surprised at any improvement in vision. The eye grounds remained unchanged.

GROSS OBSTRUCTIVE DISEASE OF THE VESSELS.

The histology of the normal central vessels of the retina, as they pass through the nerve, is of great importance in estimating the nature and amount of pathologic change to which they are liable. The central vessels enter the nerve in the lower and outer quadrant, usually almost directly below-at 10 to 12 mm. from the globe (with normal variations of from 7 to 20 mm.). The artery is generally behind the vein. They carry in with them a mantle of connective tissue derived from the pia. At the entrance two or three branches are given off, generally two arteries and one vein; these divide rapidly in the septa and end before they reach the lamina cribrosa. As the central vessels turn forward, almost at right angles, on reaching the axis of the nerve a large current branch is given off which passes backward, keeping to the middle of the nerve, giving off branches as it goes and disappearing a short distance from the optic foramen (Vossius). The artery, although a very small one, resembles in its structure a medium-sized vessel. The vein has an endothelial lining, a thin subendothelial layer, a sparse media, and a thin adventitia; there is neither membrana elastica interna nor externa.16

The question as to the actual anatomic lesion in gross obstructive disease of the retinal vessels is in such an unsettled state that one hesitates to make a final diagnosis. When it is borne in mind that the ophthalmic artery leaves the internal carotid at a right angle and that the branch of the ophthalmic that becomes the central retinal artery is also given off at an approximate right angle and that, finally, this same central artery, soon after it enters the nerve and again just when it leaves the nerve to enter the eye, makes a very

^{15.} Proc. Phila. County Med. Soc., vol. xxvi.

^{16.} Parsons, loc cit.

sharp bend, it would seem almost impossible that a floating embolus with a tendency to follow the regular blood current should pass off twice from the general blood current to finally gain entrance to the central artery of the retina. Once entered in the artery it can be easily conceived that either at the entrance bend to the nerve or at the lamina cribrosa bend it might be readily arrested and give rise to partial or complete obstruction—the more so when it is remembered that the artery under consideration is of practically microscopic caliber (an average of 190 microns, according to Parsons). The least thickening of the intima in so minute a vessel may be of moment, for if a bit of it be swept off by the blood current it immediately supplies a possible nidus for agglutinating blood cells and a resulting embolus.

That this etiology is pretty generally accepted is shown by the fact that the so-called embolic obstruction is pictured in all the atlases of ophthalmology and in most of the text-books.

In rebuttal of all this are the findings of Harms,¹⁷ who states unequivocally that "a real embolism of the central artery as first described by von Graefe does not exist anatomically."

This pronouncement, along with some others, is based on anatomopathologic investigation of twelve cases (including their clinical histories), each of which were studied in a most thoroughgoing fashion by means of all modern methods of staining and serial sections. Two of these cases presented the clinical picture of so-called embolism, seven of hemorrhagic retinitis, and three of glaucoma with intraocular hemorrhages. All were unilateral. In three cases the obstruction was found only in the retinal branches of the central vessels, and in nine cases in the course of the central vessels themselves. The age variation was from 20 to 70 years. His conclusions are (1) obstruction of the central artery may be effected by thrombosis of the previously free lumen without proliferation; (2) by primary affections of the walls—chiefly endarteritis proliferans; (3) by lime concretions; (4) a real embolism of the central artery as first described by von Graefe does not exist anatomically.

Obstruction of the central vein may be produced by (1) thrombosis; (2) by primary affection of the walls (mesophlebitis or endophlebitis proliferans); (3) obstruction of the vein causes symptoms of engorgement in the retina; (4) hemorrhages may be slight or missing (a) if cardiac weakness and incomplete plugging make up the picture; (b) if collaterals (cilioretinal vessels) exist; (5)

^{17. &}quot;Anatomic Investigations of Diseases of the Central Retinal Artery and Vein and Their Effects on the Ocular Circulation; with Especial Reference to the So-called Hemorrhagic Infarction of the Retina," 244 pp., Leipsig., 1905.

thrombotic closure may be complicated by glaucoma; (6) extensive retinal hemorrhages may be due to diffuse inflammatory disease of the vascular walls (regular hemorrhagic retinitis).

He continues: "The clinical picture of embolism and thrombosis can not be anatomically as sharply defined as heretofore claimed, as both vessels are often badly involved and the same original affection of the one, if complicated with that of the other, may accordingly present either ophthalmoscopic aspect. A reciprocal relation is the rule, as the primary sclerosis of one vessel (which is not completely closed) may create thrombosis of the other by diminishing the blood current, and this, in turn, may augment the sclerotic process in the vessel originally diseased. On the other hand, the vessel secondarily affected may be occluded first and thus determine the clinical picture, while anatomically the other vessel would show the greater changes."

He then further reiterates his first position by saying: "There is no anatomic proof of retinal infarction as first described by Cohnheim. It is rather a combination (clinical and anatomic) of socalled embolism of the artery and thrombosis of the vein."

That the combination just referred to does probably often exist there is but little doubt, and yet the two clinical pictures frequently separate themselves quite pronouncedly. Adams Frost¹⁸ offers the following differential table:

THROMBOSIS OF CENTRAL VEIN. EMBOLISM OF CENTRAL ARTERY.

Arteries—caliber normal or slightly diminished.

Arteries filiform.

Veins tortuous.

Course of veins normal.

Veins turgid; appear interrupted (from being buried in the retina).

Veins decrease toward the disc (blood column may be broken into segments).

Venous pulse on pressure. Extensive retinal hemorrhage.

No pulsation.

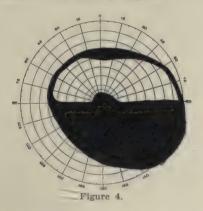
No hemorrhages-or very few.

The three cases about to be cited represent fairly well the features that are generally accepted as those of embolism.

Case 6.—On July 15, 1904, I was called to see Mrs. C. R., a married woman of 33, who stated that five or six years previously, she began to have occasional spells of transient monocular blindness, varying in duration from five to fifteen minutes. Sometimes they would occur but once in three or four months and again as often as once or twice monthly. Indeed, she had gotten to the point where she paid little attention to them as "she was always sure they

^{18.} Loc. cit.

would pass off." Twenty-four hours prior to the time I saw her the sight in the right eye had dwindled slowly (above five minutes) to nothing and so remained throughout the whole day. As this was the longest seizure she had had, she became alarmed and sent for her family physician, who asked me to see her. I learned from her that she had measles in her fifth year, chorea in her eleventh year and typhoid at 14. From that time onward (19 years) she had always been in fine health. She had never had any pain nor inflammation nor injury in either eye. The patient was a well-nourished woman of rather phlegmatic temperament, who had been married ten years without issue. No history or signs of specific infection or rheumatism could be made out. At my request she was thoroughly examined by Dr. T. H. Weisenburg, who stated that her lungs, nervous system and circulation were in perfect condition. The urinalysis was entirely negative.



The vision in the right eye equaled the perception (poorly) of hand movements in the upper half of the field. In the left eye 5/7. The anterior ocular segment of both eyes was normal, save for a sluggishness of the right pupil on monocular exposure. With the ophthalmoscope the right eye ground was somewhat hazy throughout, although much more so in the upper half. The cherry red spot was fairly well seen at the macula. The nerve head was rather fluffy of outline, had a filled-in look and was somewhat pallid, the upper arteries were thread-like, the lower ones of better size. The veins, however, were practically normal in size and calibre. There were no hemorrhages anywhere. The visual field is shown in Figure 4.

In the left eye, the media were clear, the nerve of good hue and outline, but the veins were rather wavy in the periphery and there was slight bendings in the veins at the crossings that suggested beginning angiosclerosis. A blood pressure estimate showed a high

(systolic) pressure of 141 millimeters and a low (diastolic) pressure of 112 millimeters.

Deep digital ocular massage, until pain was complained of, was immediately resorted to for about ten minutes, and thereafter twice daily. She was also furnished with an all-rubber breast pump, so hollowed out at the nipple end that it would fit itself accurately into the orbit. With this, great traction could be made on the eve and all its adnexa, and also by suitable manipulation the same tissues could be well pressed back into the deeper orbital space. She was instructed how to use it, every hour at first, and when the tissues became too tender to increase the time interval between the manipulations. She was also ordered broken doses of calomel and a heavy pilocarpin sweat and a few hours later sodii nitrite and sodium iodid. For three days I did the deep ocular massage myself, as the condition was only 24 hours old when I first saw her. On the third day, her own manipulation of the suction apparatus was so vigorous that she produced a large subconjunctival hemorrhage. But all the massage was of no avail. To-day, two years after the final blocking, there is no vision in the eye other than poor perception of hand movements in the upper field, the nerve and retina are atrophied and the arteries almost invisible.

I freely admit that there are certain features in connection with this case that suggest thrombosis or even a combination of thrombosis and embolism, but the clinical picture was that of embolism, and that was the clinical diagnosis that was made.

CASE 7.—Feb. 8, 1902, Miss E. C., age 52, a rather plethoric cripple (kyphotic), states that she has been more or less rheumatic for many years. Because of her deformity she was debarred from much physical activity, and her elimination was correspondingly poor, as indicated by a constant and rather high indican equivalent in her urine. She was given to dietary indiscretion and sad overuse of her eves at fine embroidery, to which latter habit she was hopelessly addicted. She stated that she had retired the night before I saw her with both eves normal in every way, but when she awoke the following morning she was absolutely blind in the left There had been no pain, inflammation or injury to the eye, nor had she been making any special physical exertion the day before. Dr. Samuel Wolfe, to whom I am indebted for the opportunity of studying the case, reported that there was no cardiac or circulatory disease of any kind and that the urine was normal (save for the indican and urea equivalent above noted). At the time of my examination, the next day, the corrected vision in her right eye was 5/iv. In her left eye there was not even light perception. The pupil and eye ground of the right eye was normal

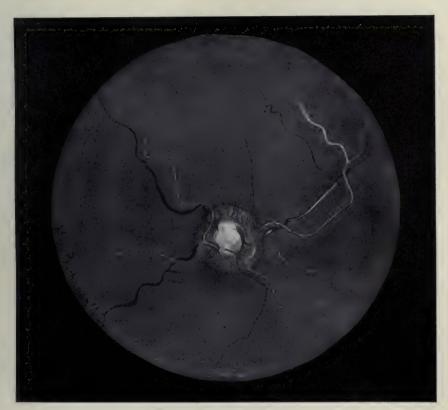


Figure 5.



in every respect. In the left eye the pupil was 5½ mm. round and without response. The media were clear, the disc vertically oval—a trifle pallid and its edges barely discernible on account of the retinal edema everywhere surrounding it. At the macula was the perfectly outlined cherry spot. The arteries were about one-half their normal caliber, the veins somewhat wavy and decreasing in size near the disc. There was a very small flame-shaped hemorrhage directly above the disc.

Deep digital massage was immediately done and followed out twice daily for three days, also all the other measures outlined in the above case, but without any effect whatsoever. To-day (4½ years later) the eye is as sightless as ever and the nerve and retina completely atrophied.

Case 8.—June 2, 1900, I was called in consultation to see a married woman of 65, of whom her family physician said that up to eight weeks previously she had been a remarkable woman physically for her years. She was the happy mother of a large family of married children and moved among them as a queen. She had always been a very active woman of fine metabolism as was shown by the unusual color in her cheeks and lips at her time of life. Eight weeks prior to the time I saw her she was thrown, the whole length of a long trolley car, in a collision and was badly shaken up, although she sustained no fractures or dislocations. At first she went to pieces nervously but she has gradually pulled herself together very well.

Twenty-four hours before I saw her she noticed a veil rapidly forming before her right eye, which inside of a half-hour had gone on to complete blindness. Dr. Goebel, her family medical adviser, could define no organic cardiac or other circulatory disease nor any abnormality in her urine.

Her vision at the time I saw her was light perception in the right eye and 5/vi in the left eye. The ophthalmoscope picture in the right eye was that of classic so-called embolism, with pallid nerve, edematous retina, cherry spot, small arteries and practically normal veins with no hemorrhages anywhere. The left eye ground showed some beginning indentation of the veins, but otherwise nothing noteworthy. Deep digital massage was employed at once, but no pilocarpin on account of her advanced years. Sodium nitrite and sodium iodid were given to toleration, and the massage continued, but there was no improvement whatever in her ocular condition.

Deep digital massage would naturally seem the most efficient means of combating embolism of the central retinal artery. Würdemann, fifteen years ago, reported two cases of embolism, one of which was wholly and the other partially cured by this maneuver. Recently he13 has added two more cases, one without any effect from the massage; the other with eventual complete restoration of function in the embolic eye. I regret exceedingly that I have no such report to make in any one of these three cases. It was surely not on account of want of massage, for all three complained bitterly of the ocular distress after it was done. From what figures I could gather on this subject it would seem that about one case in ten of embolism is likely to profit by deep digital massage, and that the tenth case will probably have to occur in some young person. C. A. Wood²⁰ warns against ascribing too much of the improvement that often follows embolus to the treatment, for not a few cases of partial and even of total embolism have receovered without any treatment at all. This point is well made, but one should not be deterred from employing deep digital massage in every case of embolus that is seen within seventy-two hours of its onset.

The cases that now follow conform more to the symptom picture known as thrombosis.

CASE 9.-May 13, 1904. C. P., aged 72, a married woman of full habit, overindulging at the table and violently opposed to any physical activity whatsoever. Wheezy, asthmatic, rheumatic for years. Drinks almost no water. Temporal arteries rigid, radial also. Facial superficial vessels dilated like those of a chronic alcoholic.

States that two years ago left eve began to fail in vision. No inflammation nor trauma. No pain in that eye until recently. Has frequently had recurring subcutaneous ecchymosis in the lower lids of both eyes. Is of phlegmatic disposition. Had decided that her left eve was of no particular use, but simply came to my service at the German Hospital to have her right eve measured, as it, too, was beginning to trouble her somewhat. The urinalysis made for me by Dr. James Attix showed an acid reaction, sp. gr. 1016, no sugar, a slight trace of albumin, a few narrow hyaline casts.

Both eyes were normal anteriorly, with the exception of shallow anterior chambers. The pupils were of normal size, but the right one reacted much more promptly than the left one. The vision was, right 5/vii ½ poorly, left 1/lx. Tension was a doubtful + 1 in the right eye and perhaps +2 in the left. The ophthalmoscope showed in the right eve cornea smooth and regular; pupil 41/2 by 5 mm., long axis 180, irregular edges; fine vitreous opacities; the disc itself was very irregularly oval at axis 45 and looked like a congenitally deformed disc. It was of a dusky gravish-red hue, somewhat excavated temporally and was almost covered with a great

Amer. Jour. Ophthal., 1906.
 Oph. Rec., 1899.



Figure 6.



number of larger vessels. There were also several small tortuous arteries passing macularward from the temporal edge of the disc. The veins were very broad, irregular of caliber, showing here and there beginning perivasculitis. Everywhere they disappeared entirely when crossed by the arteries. The inferior vein is coiled and constricted like a loop of small intestine. There were three or four very small buff-colored areas in evidence of previous minute hemorrhages into the deeper layers of the retina. Left eye: Cornea clear; lens a trifle hazy throughout; vitreous so full of large, floating opacities (probably the remains of old hemorrhages) that no fundus vein is obtainable.

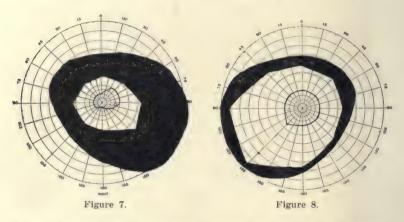
She was enjoined to remain within certain quantity limits at the table, to drink plenty of water, and to walk one-fourth to one-half mile daily. (These instructions, I learned subsequently, were wholly disregarded.) She was also ordered sodæ salicylate and sodium iodid, grs. 10, three times a day. Six months later she was seen again, when there was practically no change in the fundus of the right eye other than obliteration of the macular branch of the superior temporal artery. Soon after this the picture which is here shown was made for me by Dr. Mary Buchanan (Fig. 5). At the present writing the tension of the right eye is normal, of the left eye + 1. The conditions of the right eye ground are practically unchanged from the time when the picture was made.

CASE 10.—Mrs. S. C., widow, aged 48, seamstress, came to my service at the German Hospital April 18, 1906, stating that she had worn glasses for reading and sewing for four or five years. Two months ago the vision of the right eye failed suddenly, but afterward improved somewhat. There were no other subjective symptoms. The patient's mother died of kidney disease; her father died suddenly of neuralgia of the heart. Two brothers and three sisters are living and well. Patient has had three children, two of whom died in infancy, while the third is living and in excellent health. She also had two or three miscarriages; her last child lived. Husband died ten years ago as the result of an accident; he was a very healthy man. She has had smallpox and scarlet fever; never had rheumatism nor diphtheria. Her health has been generally good; three years ago she had an attack of quinsy.

External Examination.—Upper lid ptosic; conjunctiva normal; corneæ smooth and regular; pupils equal in size and in their response to light accommodation and convergence. The ocular movements are normal in all meridians and the eyes are steady under cover. Tension, right +1. left normal.

Ophthalmoscopic Examination —Right: Vitreous hazw; disc oval, with its long axis at 60°. The scleral and chorioidal rings were

only moderately well defined. A faint forming conus skirts the temporal aspect of the disc and the temporal two-thirds of the latter is shallowly excavated. Almost touching the disc on the nasal side is a long, irregular horizontal hemorrhage, seemingly recent. Scattered throughout the fundus are numerous small hemorrhages—some in the fiber layer, some in the deeper layers of the retina. Just above the disc is a broad sclerosed vessel (looking almost like a thin crescent moon with its convexity downward) that is crossed by the superior temporal vein, and then, in turn, it twines itself about the superior temporal vein, producing an uneven small localized edema of the retina and complete obliteration of the superior temporal vein for about 1 disc diameter, when the latter (purplish in hue) seems to pop right straight forward, apparently almost out into the vitreous and then curves backward to the retinal plane. Everywhere throughout the fundus when an artery crosses a vein



it wipes it out, and the veins when crossing are hooped over the underlying artery. The veins are broad, dark and very tortuous. For the accompanying picture of this fundus also I am indebted to the skill of Dr. Mary Buchanan (Fig. 6).

In the left eye the media were clear, the nerve head edges somewhat veiled, the disc was generally shallowly excavated, the arteries much wavier than in the fellow eye, but the light streak was better. The veins were moderately indented at the crossings. There were three or four small hemorrhages in the fiber layer of the retina, the veins were rather serpentine, but of good caliber and color.

The visual fields are here shown (Figs. 7 and 8). The urinalysis²¹ was as follows: Reaction acid, sp. gr. 1022, strong trace albumin, no sugar, urea normal, indican absent; microscopically there were found urates, a few leucocytes and squamous epithelial cells.

^{21.} Courtesy of Dr. Duncan.

The patient was referred to my friend, Dr. R. Max Goepp, who kindly furnished the following report:

Present Condition: Except for impaired vision, she is now in excellent health, slightly dyspneic on exertion; some giddiness, no swelling of feet, appetite good and bowels regular. There is occasional nocturnal micturition.

Physical Examination.—Color of the face sallow, with venules of the skin well marked. Prominent veins at the temples and especially on the hands. The lower lid puffy, suggesting nephritis. Temporal veins prominent and tortuous. The body generally is emaciated; the chest is of the chicken-breast variety, and expansion is somewhat diminished. Pulse, 88; regular; tension increased; radial and brachial arteries atheromatous (pipestem); visible pulsation in the brachials.

Heart.—Apex beat is seen and felt in the fifth and sixth interspaces almost as far as the anterior axillary line. There is no thrill; heart action not exaggerated. Cardiac dulness above third rib; right border 11/2 fingers' breadth to the right of the right border of the sternum in the third interspace; lower left border about one finger's breadth below the nipple in the fifth interspace. (The position of the apex beat can not, I think, be taken as indicating enlargement of the heart to the left; by percussion the cardiac dulness appears to be approximately normal.) The action is regular, the first sound has good muscular tone. The second sound both at the mitral and at the base is exaggerated. A short, puffy systolic murmur is heard both in the aortic and in the mitral area. The murmur is transmitted a short distance into the axilla and is also heard at the right border of the sternum in the third and fourth interspaces. Its maximum intensity appears to be near the xiphoid cartilage. It seems to me that there are two separate murmurs, one mitral and one aortic; that the mitral, which is transmitted into the axilla, indicates an old mitral insufficiency and the aortic systolic murinur an atheromatous condition of the aorta. While there is no history of rheumatism in the family or previous history, the patient has had "quinsy," which not infrequently indicates rheumatic infection of the throat. The lungs and the abdominal viscera are normal.

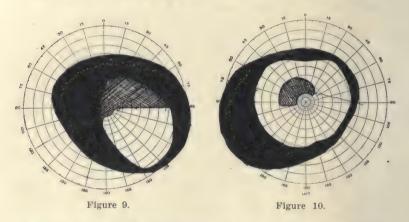
Blood pressure (Stanton's instrument): Systolic, 202 mm.; diastolic, 179 mm.

Two weeks later, under potassium iodid, suitable regimen and copious water drinking, the blood pressure had fallen from 202 in systole to 179, and 188 in diastole to 157. The pulse tracings taken one week later by Dr. Goepp showed "a great distance from the ordinate to the apex of the wave, with absence of a dicrotic wave,

probably due to rigidity of the vessel wall. The apex of the curve is also quite blunt. The patient's blood pressure was to-day 195 mm. systolic."

Case 11.—H. A. K., aged 67, a retired farmer, has always enjoyed perfect health and lead a regular abstemious life. After retiring from his farm, he walked several miles daily and thus preserved his former excellent physical condition. One year ago, without any previous illness, pain, inflammation or injury to his right eye, it suddenly became "one-half blind." He could only see the lower half of things. Later he lost also the lower nasal quadrant, but he still sees things after a fashion in the lower temporal field. The man was of superb physique. Radials and temporals soft and easily compressible. His family medical adviser stated that there was no cardiac disease whatever.

The vision in the right eye was 1/c (eccentric), left eye 5/xii.



Both eyes were normal anteriorly, save for shallow anterior chambers. Tension was normal also on both sides. The visual field of the right eye is herewith shown²² (Fig. 9). The ophthalmoscopic findings were: Right eye, disc irregularly oval at 180; scleral ring, knife-edge sharp all round; chorioidal annular atrophy ½ disc diameter all round; disc shows a large deep pathologic cup involving all but a one-fourth crescent of nerve head tissue on the nasal side. The disc was chalky white, the arteries thread-like, the veins wavy and dark, the whole eye ground filled with small areas representing former multiple hemorrhages. There is now in process a generalized sclerosing chorioiditis.

Left eye: Disc irregularly oval at axis 180°. The scleral ring is very sharply outlined everywhere, the chorioidal annular atrophy

^{22.} The black area means no perception; the heavily shaded portion means very poor light perception; the lighter shaded area means poor form perception.

appearing the same as in O. D. The whole disc was shallowly cupped, was decidedly pale, and the vessels bent sharply at its lower edge. The outlying veins showed marked pressure from the accompanying arteries. The visual field of this eye is also shown There seems a great probability that in this case thrombosis in the right eye was responsible for the postglaucomatic picture now in evidence, and that it would require precious little added interference with the circulation in the left eye to precipitate a glaucoma on that side. The manner in which glaucoma secondary to thrombosis may simulate primary inflammatory glaucoma is graphically shown by the succeeding case history.

CASE 12.-Mrs. M. C., aged 65, came July 29, 1899, stating that her right eye began to pain her badly and to lose sight rapidly eight months ago. After that she had continuous temporo-occipital neuralgia. She had been using atropia religiously under the guidance (?) of her family medical adviser, in spite of the fact that its use once a day almost invariably aggravated her pain. She was a woman of full habit, fond of the table, and given to a sedentary life. The right eye was a complete picture of inflammatory glaucoma with a somewhat hazv cornea, full, purple episcleral vessels, intense pericorneal zone, rigid pupil 5x7 mm., lens thoroughly opaque and tension +3. The left eve presented a pupil of 5 mm., regularly round and of good reactions. The media were clear, the disc very large, irregularly round, shallowly excavated throughout its extent. The arteries are a trifle small, kink somewhat at the disc edge and the veins broad, dark and serpentine, exhibit an exaggerated light streak and show pressure when crossed. The scleral ring is very sharp temporally and a large semiatrophic conus skirts the disc to its outer side.

There was not even light perception in the right eye. Corrected vision in the left eye was 5/vi. The visual field of the left eye at that time is herewith shown (Fig. 10). Iridectomy was urged simply as a pain reliever, and, in the event of failure with that, enucleation, both of which were politely but unmistakably declined. She was then subjected to the constant galvanic current, with the anode over the eye daily for 15 minutes, and with this was combined ocular massage and eserin. After six weeks the right eye quieted down entirely, with tension of +1 and no pain. Four years later this eye developed a conjunctivitis and infected corneal ulcer, which was extremely difficult of treatment because of the pre-existing glaucoma; but was finally controlled with tincture of iodin and dionin locally. But a few days later, while stooping over an unusual length of time to tie her shoe, there was spontaneous rupture of the cornea, and enucleation was done the following day.

The interesting phase of the case now appears. Two years later, after the left eye had held up to vision of 5/v, and without any appreciable cause, the vision began to fail without any pain, and within one day fell from 5/xi to 2/xlv. When she returned I found the tension + 1 and the eye ground sprinkled everywhere with small spindle-shaped hemorrhages in the fiber layer of the retina, with one small circular one right in the macula. The arteries were a bit too small—light streak poor and pressure points on the dark twisted veins quite marked. She was sent to the Polyclinic Hospital, where no special affection of her heart or vascular system was found. The urine was said to be normal. In spite of her age and because of her desperate plight, she was sweated heavily with pilocarpin every day for two weeks (now 70 years of age!), but without avail. The blood pressure before treatment was instituted was high (systolic), 187; low (diastolic), 141.

To-day, after 4 months of alterative treatment, her vision is 5/45 poorly and slowly (eccentric); the visual field shows a 10° central scotoma corresponding to the macular hemorrhage above noted.

This case illustrates how the blocking may produce the signs of glaucoma in one eye and of true thrombosis in the other eye. The probability is that much of the hemorrhagic glaucoma of the older authors was really secondary glaucoma of thrombotic origin, as in the foregoing case. Indeed, in some instances, it is a nice question to decide in a given case between thrombosis, secondary glaucoma and intraocular tumor.

"Glaucoma," says Knapp,²³ "is not so much a consequence of faulty development, but rather an inflammatory affection which in all probability develops as the result of a chronic organic disease; and here, I think, vascular sclerosis is the most likely cause; and if there are more causes than one this one appears the most frequent. This agrees also with pathologic investigation and, while arteriosclerosis does not forcibly produce glaucoma, it may easily prove a powerful predisposing condition."

^{23.} Knapp's Archives, vol. xxv, p. 294.

OCCLUSION OF A BRANCH OF THE CENTRAL ARTERY OF THE RETINA.

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Children's Home, Indiana State Soldiers' Home, Pension Bureau, Etc., Etc.

LAFAYETTE, IND.

The term "occlusion" is used purposely, because the case, from a close study of the fields of vision herewith submitted, leads one to believe that we deal with a case of thrombosis of one of the branches of the retinal artery due to endarteritis rather than embolism. The case is as follows:

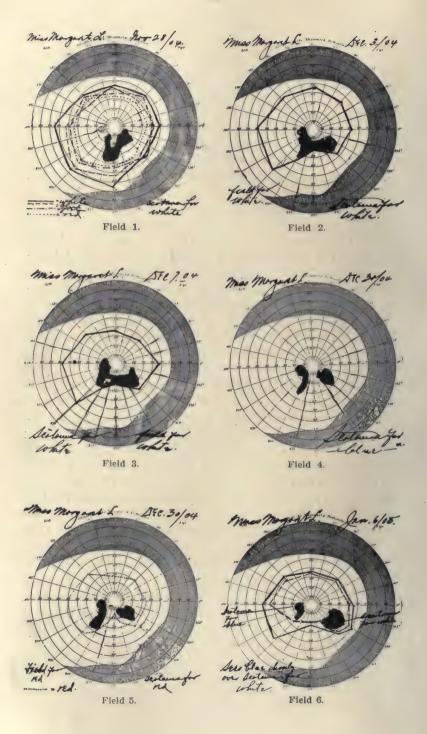
Miss Margaret L., age 19, dressmaker by occupation and a resident of this city, came to see the writer Nov. 28, 1904. She was referred to me through the kindness of her physician, Dr. Milton S. Hopper. She complained of a failure of vision of the left eye since November 24. She has worn specs for four years, but says that her eyes have always been weak. There is no hereditary tendency toward eye trouble. Her general health has been fair, save for numerous headaches, which are supraorbital and intraocular. No heart lesion is discoverable. Examination of the urine shows no abnormality. The vision for colors is normal, and there is nothing wrong with the external ocular structures.

The vision of the right eye is 20/xxx, and a + 1.00 D. spherical lens brings it to 20/xx. Under a mydriatic (homatropin and cocain), the vision is 20/cc, and a + 1.00 D. sph. c. + .25 D. cyl. ax. 55° brings the vision to 20/xx.

The vision of the left eye is 20/40, and a + .50 D. cyl. ax. 120° brings the vision to 20/xx. Under a mydriatic the vision is 20/cc and a + 2.00 D. sph. \bigcirc -.20 D. cyl. ax. 125° gives 20/xx.

The field of vision for the right eye is normal. That for the left eye is contracted for form and color and with irregular color fields. There is a larger, irregular, absolute scotoma for white below (see fields for Nov. 28, 1904).

Ophthalmoscopic examination shows the fundus of the right eye to be normal. The fundus of the left eye is nearly so, save for pigmented spot directly above the optic disc, one and one-half disc diameters distant and a hyperemic optic nerve head. She received glasses containing all the astigmatic correction plus one-half the spherical correction. Internally she took 1/60 gr. strych. sulph. every four hours and ascending doses of potassium iodid (saturated solution) as often. On December 3, five days after her first visit, she returned, stating that the vision of the left eye was worse, and on examination we found it to be 25/c uncorrected. Ophthal-



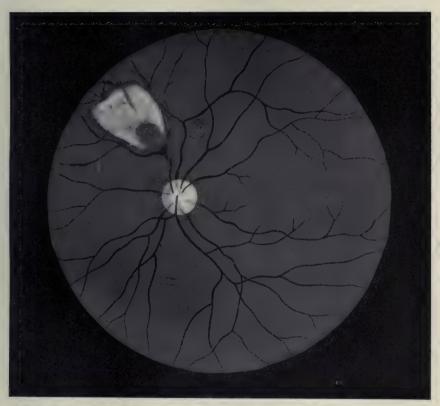


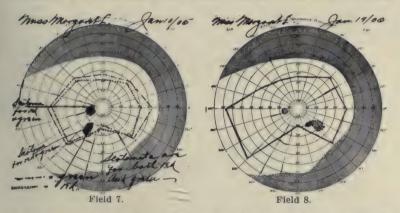
Fig. 1.—Condition of fundus of left eye, Dec. 3, 1904, showing occlusion with hemorrhage and paling of retina supplied by occluded artery.



moscopic examination revealed the fundus as shown in the colored drawing of the above date. Up and in a disc diameter and a half is a hemorrhage nearly a disc diameter in size. This hemorrhage is at the tip of a large white opacity of the retina extending further upward and inward. Within the opaque retina and through its center is a constricted artery which dilates above and apparently branches. We now resorted to deep massage as an adjunct to the above treatment. Examination of the fields of vision for white shows it contracted below from 65° to 25°, and the scotoma of November 28 is pushed upward and is quite large and irregular, as shown in the attached illustration for that date.

The fields for colors were not taken, because the patient tired so easily. On December 7 the same condition practically exists.

We had no good opportunity to observe the fields of vision until December 30, when the fields of the various colors with reference



to the scotomata were taken. Those for blue and red are practically of the same size. The large scotoma for white is thus broken up into two parts for red and blue, with the part between the two colors for white. On Jan. 6, 1905, on taking the fields of vision for blue and white, we obtained the condition seen in the chart of that date. While the fields are contracted, the scotoma is broken into two parts. Blue is seen dimly over the scotomata for white.

On January 10 the fields were taken for red and green. Two scotomata are seen below and to the left of the center which are equal in size for both colors.

On January 19 the field for white was taken, which while indented below is larger than in previous examinations and the scotoma for white is much smaller, as shown in the accompanying chart.

On March 15 the fields were again taken for form and color, as shown in the chart for that date. The scotomata are gone, but in

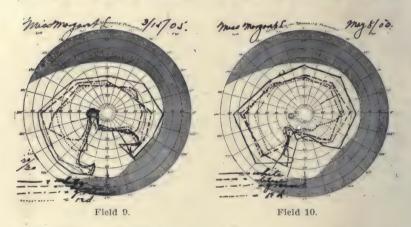
their place is a very deep indentation of the fields which corresponds with the defective portion of the retina. Deep massage is still being continued.

May 8 shows a marked improvement in the fields of vision, as shown in the chart of that date.

The record shows that on July 25 the vision was 25/xxx and that new blood vessels are forming in the area formerly supplied by the occluded vessel.

November 30 the vision was 20/xx in the left eye and the area of occlusion is assuming the color of the surrounding retina. The vision has since remained normal.

No further examination was made until Aug. 18, 1906, which was made at my request. The condition of the fundus is shown in the accompanying drawing. The area of occlusion is quite



pinkish, but not quite the color of the surrounding retina, and within the area are seen quite a few new small blood vessels branching from the artery which was occluded. However, chorioiditis is evident beneath the retina and around the borders of the area formerly occluded. The small spot of pigmentation seen Dec. 3, 1904, is no longer visible. The fields of vision for this date are a marked improvement over those of March 15, 1905. The retina is evidently resuming its function.

The peculiar features of this case are apparent from a study of the fields of vision. Before the ophthalmoscope could discover it, the field of vision has blocked out a defect (in the scotoma) which was the forerunner of the occlusion. In other words, the field of vision really warned us of the local endarteritis before it was visible to the eyes. Moreover, more of the retina was affected than is shown in the ophthalmoscopic picture, because of the marked re-

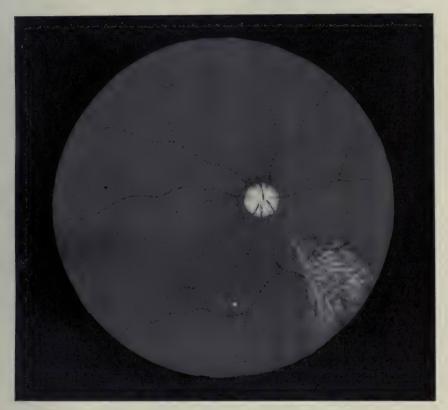
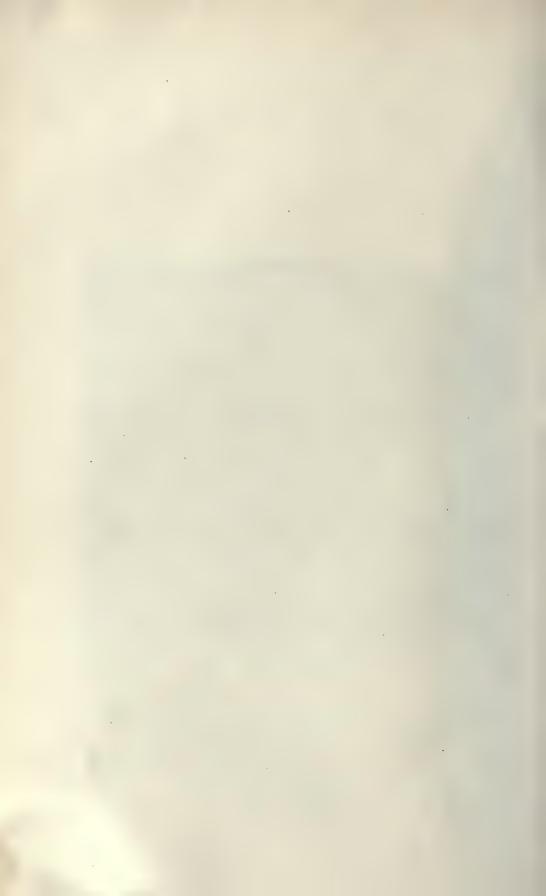


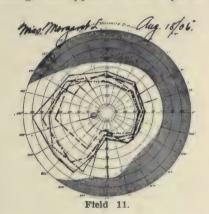
Fig. 2.—Condition of fundus of left eye, Aug. 18, 1906, showing new blood vessels in the area of occlusion of Dec. 3, 1904.



duction in vision to 25/c, and the query is pertinent, "How much further damage did the deep massage prevent?"

The treatment of the case is summed up in the application of massage to the eye. True at first strychnia sulph., 1/60 grain, every four hours, was given together with ascending doses of the saturated solution of potassium iodid, and after the application of the massage hot applications were made to the eye through the closed eyelids.

In the treatment of these cases the patients are taught how to do it themselves. The method is carefully demonstrated to the patient, and the patient does it in the doctor's presence to assure the physician that he or she does it right. The method is as follows: Thrice daily the patient rubs the eye a number of times slowly for ten minutes both through the upper and lower eyelids while the eye is



closed. The rubbing is firm and toward the nose. No cocain nor oil is instilled in the eye, the idea being to pursue the treatment according to the principles laid down for massage applications. In the office the treatment received at my hands every other day, if possible, is more vigorous, the eyeball being pressed deeply into the orbit, held there a few minutes and then released as Borkan advises.

The literature of this subject from the standpoint of this method of treatment is not large, and it is with pleasure that I direct the attention of the Academy to the very excellent paper of Dr. Würdemann upon this subject which he read at the Buffalo meeting in 1905. In conclusion, I wish to add that I have at present two cases of occlusion of retinal vessels, one of a branch of a retinal artery and the other of the central vein, which are showing marked improvement under deep massage, but which have not progressed far enough to warrant a report at this juncture.

DISCUSSION.

ON PAPERS OF DRS. REBER AND KEIPER.

Mr. Gunn, London, said he was sorry that he missed the first part of Dr. Reber's paper, which he understood dealt with the appearance of the fundus in the early and late stages of sclerosis. It is a subject in which he has been very much interested for a good many years. All the changes are easily recognized and, he thinks, ought to be seen by every ophthalmic surgeon and every physician who can use the ophthalmoscope. These changes are very important. Were they difficult to recognize, it would be special work in the hands of a few, but they are easily recognized. He was much impressed with the fact that changes of this character or tuberosities in the vessels are circulatory; and, the fact of the overlying arteries causing depressions or slight displacement of the veins, that these changes in several instances were the first evidences of serious general disease.

He mentioned a case of a woman who came to him on account of some presbyopia. At her first visit all he noticed was that the retinal arteries were brighter than usual; there were no tuberosities. About three or four years afterward she came back and then he noticed they were irregular in caliber and beginning to depress the veins. He therefore wrote her physician and asked for a general report in regard to the condition of the system, especially with regard to renal secretions. The physician wrote that she had suffered for eighteen months or so from obscure dyspeptic symptoms; the urine was perfectly normal, and he did not regard it as a serious state. She came back not long afterward with an account of dimness in one eye and Mr. Gunn found she had a little edema and one small hemorrhage. He asked again for a report. She told him she had a new physician. In five tests this physician had found a trace of albumin twice and was in doubt as to whether the kidneys were involved. Dr. Gunn then lost sight of her. The next time she came she had what she called a "slight stroke." He advised her to see a neurologist, which she did, and he said she had undoubtedly had an attack of paralysis, from which she had partially recovered. Mr. Gunn asked the neurologist if there was anything wrong with her general vascular state and her kidnevs; he did not think there was. Three months afterward Mr. Gunn was told by her husband that she was dying from renal disease. So that years before there was any apparent evidence to two good physicians of this serious disease affecting her, the ophthalmoscope easily gave the signs. Therefore Mr. Gunn thinks it of great importance that these cases should always be examined very carefully. It is a very rapid thing to accomplish, and he especially thinks it should be done in all cases of examination for life insurance. He wanted to see at the Hospital for the Paralyzed how many he could recognize by the ophthalmoscope, and asked the house physician to direct him to the wards and show him the cases of hemiplegia. He picked out with the ophthalmoscope the cases due to vascular disease. Of these patients, all died within six months. In every one in whom the retinal changes were marked, at the postmortem changes were found in the kidney. Two out of four had no albumin in the urine and no evidence during life of kidney disease. The same vascular changes were taking place in the retina, the kidney and the pia, and the ophthalmoscope was the only means of determining it. It is an easy manner of recognizing very early evidences of serious general disease. This means is coming more and more into use.

Nowadays physicians are beginning to believe that in most of the cases the ultimate changes are of a toxic character, interfering with the relationship between the blood and vessel wall, and all are interested in means by which they can find early evidence of these changes taking place. There is nothing in the urine in these early cases. The blood pressure is not a safe guide. Physicians seem now to be exceedingly interested in this thing, and it is only in the last few months they have come to the idea that they can see by the ophthalmoscope the vessels and study their changes. By that time the changes are established, because the early relationship must have been altered some time before, but it is earlier than any other changes.

DR. ALLEMAN, Brooklyn, said that years ago Dr. Weir Mitchell made the statement that "The ophthalmoscope is to-day in the same stage of development as was the stethoscope in the day of Laënnec," and he thought that the paper just read justified this prediction. It is but a short time since it was emphatically stated in the text-books, that the ophthalmoscope would only enable us to detect advanced vascular diseases, but to-day it is recognized as one of the most valuable agents in the detection of the functional derangement which precedes vascular changes. He believed that Loring was the first, at least in this country, to point out the absurdity of supposing that an embolus would occlude a retinal artery, again and again producing transient attacks of blindness, and in showing the probability that these cases were due to vascular diseases rather than to an obstruction from an embolus. The great difficulty in these cases of beginning vascular diseases is in getting a confirmation of our diagnosis from a physical examination. He was somewhat comforted to hear Mr. Gunn say that the same difficulty is experienced by physicians in England. The presence or absence of albumin is of no significance in these cases. If possible, it is necessary to make a diagnosis in the pre-albuminuric stage, and when the typical picture is found in the eye-ground. Dr. Alleman is convinced that confirmation will never fail if a complete and repeated chemical examination of the urine be obtained. An examination of a single specimen of urine is useless, but if a sample of the 24-hour urine is taken and properly examined, the retinal findings will always be verified.

There is, however, one class of cases in which Dr. Alleman is somewhat in doubt, as to the reliability of the retinal picture, as he interprets it. These are the cases with improper elimination, and low arterial tension. These cases require farther study. Again he has seen cases in which there was a marked lack of transparency in the vessel wall, which later disappeared. He can not believe that actual sclerotic changes in the vessel wall are thus easily improved, and the only explanation, which seems rational, is that some change in the continued fluid or in the blood pressure has rendered the vessel wall temporarily opaque, and that with the relief of this condition the vessel wall resumes its normal transparency.

Dr. Lamb, Washington, said his attention was called to this by Mr. Gunn's collaboration with Sir William Gowers and it made such an impression that he began to pay particular attention to these conditions. He believes all these cases in the beginning are nutritional; due to faulty metabolism. The oculist must not forget what he knew about general medicine, but try to keep in mind all he knows about anatomy and physiology; and again if these men who are connected with institutions of learning and can call the attention of the general practitioner to the use of the ophthalmoscope to help in their diagnosis, these cases would be sent to the ophthalmologist earlier. Many of them can be readily recognized in their earlier stages, and often he has had to refer patients to the general practitioner when they came with what turned out to be a temporary blindness. It was simply a want of nutrition to the part. The blood was not good blood; it was not nourishing. He has noticed that the fine, small vessels crossing the disc are early affected in these condi-

tions, being obscure and very hazy even before the vision is dimmed. These small vessels can not be seen in the early stages of this trouble, but as soon as the nutrition is brought up to par any number of them can be seen. He would make a plea for the more careful examination of the optic disc in these cases.

Dr. Lukens, Toledo, Ohio, said that a case of embelism of the retina came under his observation a year ago last June. He saw it within twelve hours of the time the obstruction took place. It was a typical picture of embolism, with gray retina, empty vessels and red spot at the macula. He had not then read of Dr. Würdemann's success in these cases. He started first with nitroglycerin to relax the arterioles, and after getting its effect (about 10 minutes) he began massage, making firm pressure until he reduced the tension to at least - 2. This procedure completely abolished light perception for a time and the patient thought the treatment had done harm and Dr. Lukens was dismissed from the case. Another ophthalmologist was called in, who reversed Dr. Luken's treatment, but afterward started massage again. Nine months later Dr. Lukens heard from her husband that she had enough sight to see to play solitaire. She recognized certain forms, but could not get around, her other eye was blind from an injury in childhood. In this case massage was a failure, but possibly the failure should not be charged against the massage, as there was a fatal delay of several days right at first, when they "changed doctors."

DR. LICHTENBERG, Kansas City, said that in regard to Dr. Reber's paper, and the point he made of the early recognition of the beginning of an arteriosclerosis, he would call attention to a class of cases which come for correction of ametropia. There is a fundus which is red-hyperemia. On looking at the blood vessels both veins and arteries are found to be tortuous, which increases toward the periphery. Hence, he would plead for the examination of the periphery as well as the macula. These patients are usually people living a busy, professional or social American life. They live under high tension. He has had them examined by general practitioners and pathologists with negative results, and despite this, it has been his custom to warn them with regard to their life habits, and to tell them of the possibilities of their condition.

DR. REBER, said that it is difficult to arouse the attention of the general physician in this matter. When physicians understand that opthalmologists are studying the blood current under a magnification of from 10 to 15 diameters and that their observations may lead to the diagnosis of arteriosclerosis at a time when much may be done for it, better results may be hoped for. One man's work in this direction is but little. It is the collaborated or collected results of the work of twenty-five of fifty observers that will be of untold value. He once wrote the presidents of three or four large insurance companies as to the value of ophthalmoscopic examinations in doubtful cases and for his pains was told by all of them in practically the same words that "they were already spending altogether too much money on medical examinations." Ophthalmologists do not look at their cases attentively enough. Close study will often reveal beginning changes and these the only ones that are worth while (Dr. Reber showed some drawings illustrative of the conrecognizing.

DR. KEIPER said that the point is well taken that ophthalmologists should resort to the ophthalmoscope, but he would like also to show that after all they may have to go further back and take a perimetric chart and show the defect before it is shown by the ophthalmoscope itself. (Dr. Keiper illustrated on screen).

Dr. Würdemann said that the few cases of typical thrombosis of the central vessels he had seen had followed mumps, possibly developed by trauma. One came to enucleation and was subjected to full pathologic examination. (Archives of Ophthalmology, xxiii, No. 4, 1894). An embolism is probably a thrombosis, but for clinical purposes may be treated as a clot carried into place. Twenty cases have been subjected to treatment by deep digital massage; about half of the patients made complete or incomplete recovery. If a clot be very large, certainly it can not be broken up or disintegrated by massage or anything else. In massage of the eye for embolism, and this can only be done during the first few days, one must make such heavy pressure that the clot is dislodged by the pressure. Dr. Würdemann presses with the thumb until the patient screams with pain. Patients will only stand three to five treatments, and are subjected to pilocarpin sweats. (Dr. Würdemann here showed a series of pictures of the fundus oculi in such cases.)

Dr. MITTENDORF, New York City, said he had on several occasions referred cases to the family physician, but had been met with the reply that there was nothing the matter. In one case he had insisted that the patient go to the country and lead a quiet life, but his advice was not taken and in about a year afterward the man died. Another case was referred to Mittendorf by the physician, and when he made the report as to the condition of the retinal vessels, the physician was very careful and placed the patient on the strictest diet and quiet and so on, but unfortunately the case was too advanced and the patient died in about two months. He has come to look on temporary blindness as not always a very serious sign of actual blood vessel disease. One of his students came to him and said: "I have one of those blind attacks in my eye." Dr. Mittendorf said: "Let us look at your retina at once," and he found that the retinal vessels were blanched and apparently bloodless. He instructed him to begin deep inspirations, and could see the blood shoot back into the vessels. He has seen this patient for the past twenty years, and he is enjoying most excellent health. So not all of these cases are serious.

TREATMENT OF PARTIAL OPTIC AND RETINAL ATROPHY BY ELECTRICITY AND MASSAGE,

H. V. WÜRDEMANN and G. I. HOGUE, M.D. MILWAUKEE, WIS., U. S. A.

The treatment of ocular diseases by means of electricity and massage has been sadly neglected by the regular practitioner and greatly abused by the charlatan. A warning must be given as to the indiscriminate use of massage of the eye. It has been in the hands of quacks and osteopaths and much damage has been done thereby (case cited of Kansas City man with high myopia whose eye had detachment of the retina from quack osteopath). Electricity is only a placebo in the hands of empirics; properly used it can be of incalculable benefit in many cases.

The literature on this subject is, indeed, limited. W. Franklin Coleman's able article, "Some Personal Experiences in the Use of

Electricity in Ophthalmic Practice," read at the last meeting of the American Medical Association, LeMond on "The Value of Faradism in Chorioiditis," and Starkey's "The Use of Galvanism in Pterygium" constitute about all the American literature we have to-day. Coleman reports fourteen cases of optic nerve atrophy treated by electricity, a summary of which is herewith given: "Fourteen patients, 23 eyes. In 5 eyes in which vision = light, 40 per cent. were improved. One to seeing hand movements and one to 20/lxx. In 18 eyes in which vision = form, 64 per cent. were improved; four, 60 per cent. to 125 per cent.; two, 300 per cent.; three, 500 per cent.; one, 1,500 per cent.; two from seeing fingers to reading. In six there was no improvement."

This splendid showing obtained by Coleman must convince the most skeptical that electricity has some virtues. The physiological action of electricity is wrapped in more or less obscurity; it very much resembles the medicines we classify as alteratives. In the migration of ions that takes place, the cells are stimulated to increased energy and regeneration occurs. Luduc, of Nantes, has demonstrated the migration of ions through the tissues, and is of the opinion that the effects of electricity are due to the redistribution of the ions. E. G. Morton states that there seems to be no doubt that some rearrangement of molecules does take place in the tissues, and the compounds thus formed, as well as the electrolytic process itself, may be largely responsible for the effects of electrical treatment. Rockwell conducted experiments on the effects of electricity on the general nutrition and found that young dogs treated by general faradisation gained weight more quickly and became perceptibly larger than others of the same litter not so treated, but brought up under exactly similar conditions; others have found that if the muscles of, say, one leg be treated regularly for three or four weeks by electrical methods they become larger and heavier than of the opposite leg.

Electricity is not a specific, but that it possesses power to increase nutrition, to increase excretion of waste matter and cause local anesthesia can be readily demonstrated, for example: Examine the optic disc before an electrical treatment and then again after the treatment, and you will be surprised at the ruddy color of the nerve head, even to the point of obscuring the view of the same; or palpate an eye with a plus tension and note the marked reduction in tension after you massage the eye. The optic nerve is very sensitive to electrical currents. (For proper stimulation of the optic nerve, the indifferent electrode should be placed at the back of the neck and the active electrode on the closed eyeball.) It is important that

we use only the weakest current possible, as too strong a current may cause damage to the retina.

The anode (or positive) pole has the following power: (1) anesthetic, (2) sedative, (3) hemostatic; it is less destructive than the cathode. The cathode (or negative) pole acts as (1) a stimu-



lant, (2) quickens absorption, (3) increases moisture, (4) dilates blood vessels and lymphatics.

There are many electrical instruments on the market to-day. We have used for the past year the Victor Electric Company's wall plate No. 2, and found it very satisfactory. Our best results were obtained with the combined galvanic and faradic current and the high tension faradic. The former current is peculiar to the Victor

wall plate. The negative pole is applied directly over the eye and the positive is applied to the nucha. Our patients would tolerate from five to ten milliamperes; the duration of the treatment varied from three to five minutes every day or every other day. Such a treatment could be continued for weeks or even months. Galvano-faradisation, so called by de Watteville, has the effect of giving increased volume to the faradic current, and the refreshing action of the galvanic also tends to counteract any bad effect of overstimulation by the faradic current. The contraindications to the use of electricity in ocular diseases are in cases of iritis, iridocyclitis, or any acute inflammation of the eye.

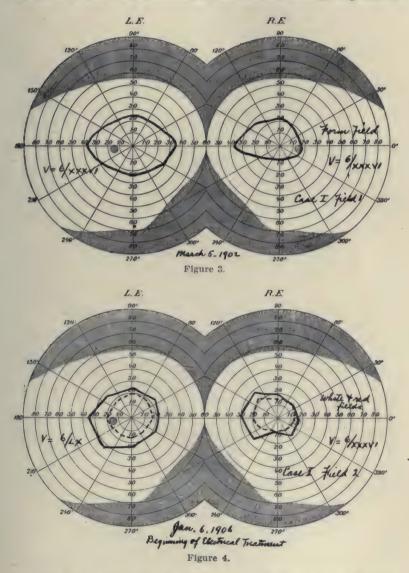


Figure 2.

MASSAGE.

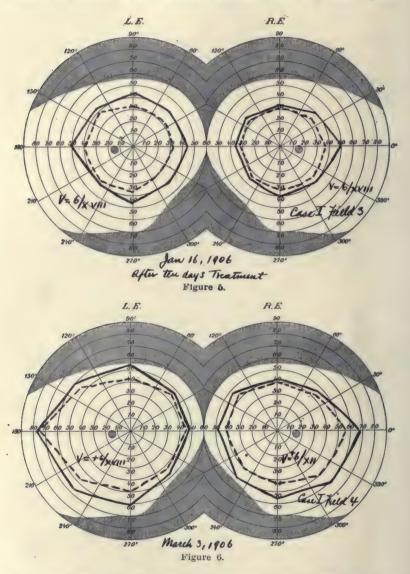
Massage has been employed in the treatment of diseases of the eye since the early 70s, but particularly during the past fifteen years. Donders formally introduced eye massage to ophthalmologists at the London Congress in 1872. Pagenstecher has done more than any one else to spread the knowledge of this therapeutic agent; he published his first report in 1878, and it aroused marked interest. In 1881 he compiled a report on the therapeutic value of massage in many diseases of the eye. Since that time Schenkl of Austria, Panas of France and Gradenigo of Italy and many others have added valuable contributions to this subject. Würdemann has used deep digital massage with success in embolism of the central artery. Most of the authors employed digital massage, but we

find that mechanical massage easily supplants and is, furthermore, an improvement over the digital method (except where very powerful action is desired, as in recent embolism of the central artery), first, on account of cleanliness, as the rubber massage cup can be



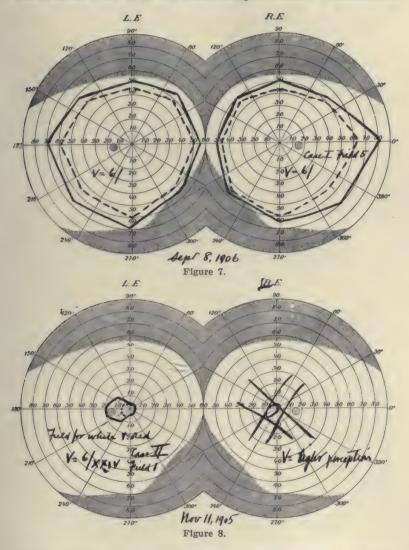
sterilized in a 5 per cent. carbolic solution; secondly, more uniform vibrations are obtained, and, thirdly, it is less distasteful to the patient. We have for the past year employed a rubber cupped massage handle, which receives its power from the Victor trans-

former No. 2 and the Pynchon pump attachment. The nipple of the pump should be at a point two-thirds distance to the right when we obtain vibration or alternate compression and suction. The force or gentleness of the stroke is also regulated by thumb pres-



sure over the hole in the handle. Great care should be exerted that neither the length nor the amount of the stroke causes any discomfort. In fact, the slower the stroke the better it is. We obtain the best results with 50 to 150 vibrations per minute. With the trans-

former and pump attachment the length of the stroke varies from 0 to $1\frac{1}{4}$ inches, and the length of the stroke desired can be selected by a gauge attached to the crank pin. The rapidity of the piston stroke varies from 30 to 600 vibrations per minute. Contraindica-

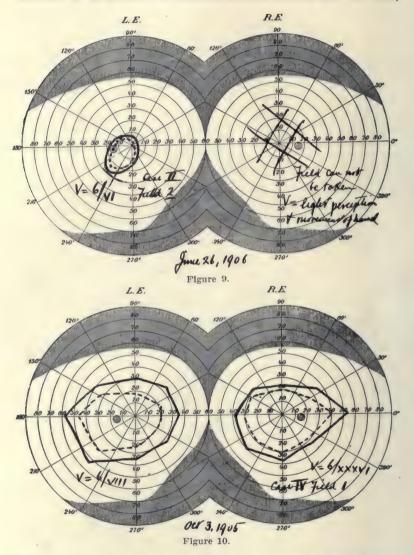


tions to massage are the same as in electricity, namely, any acute inflammation of the eye.

OTHER MECHANICAL MASSAGE INSTRUMENTS.

S. B. Muncaster, of Washington, D. C., in the Ophthalmic Record, 1902, published "A New Method of Treatment for Chronic

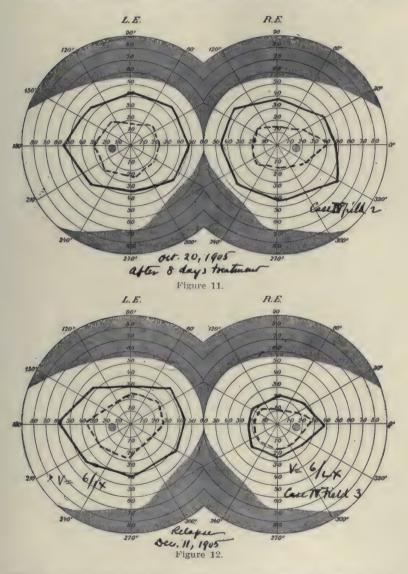
Intraocular Diseases, Such as Atrophy of the Optic Nerve, Chorioidal Trouble, Etc." He employed an "ophthalmo-oscillator" and reported four cases treated during a period of two months, claiming results to be good. From Germany comes the idea that small glass balls are to be mounted on suitable slender holders and the balls,



which may be as much as one-half inch in diameter, are to be passed up between the ball of the eye and the lids to there be moved about

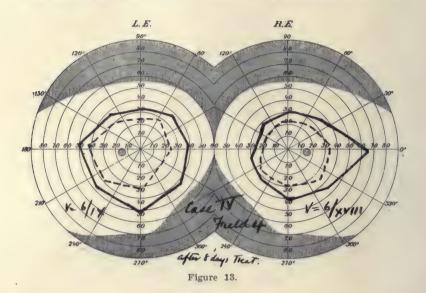
^{1.} This particular instrument was advertised widely to the laity through the printed puffs of an irregular who made extravagant and unsubstantial claims for "his" method and "his" instrument.

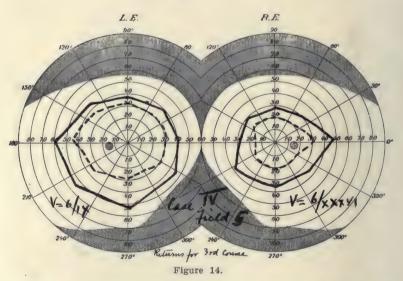
and the local parts in this way thoroughly massaged. It is stated that good results are accomplished in this manner, but we are skeptical of the value of this procedure. Biers has just published an article entitled "Hyperemia Treatment in Affections of the Eye."



This he accomplishes by tying an elastic band around the neck of a healthy person and allows it to remain there from three to eight hours daily. This procedure he recommends in young persons with visible affection of the eye and no complication of the inner eye.

Of this method we have no personal experience, but it seems to us to have little scientific basis. Bellarimow's ivory tipped masseur has been used by us for corneal opacity, but is not useful in deeper



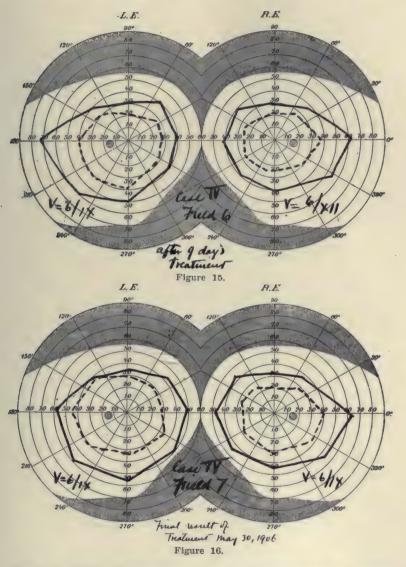


affection. Indirect massage has also been employed with good results. We have used the Bilmayer instrument, with two fingers of the operator placed on the patient's closed eyelid and the tip of the vibrator on the fingers.

INCIDENTAL USES OF ELECTRICITY AND MASSAGE.

Glaucoma.—Relieves tension, corneal opacities, chorioiditis, retinitis pigmentosa, phlyctenular keratitis, etc.

Case 1.—Patient, Master R. R., age 10. Seen for the first time



March 5, 1902. Examination showed hydrocephalus and rotary nystagmus. V. O. D. = 6/xxxvi; O. S. = 6/xviii. Visual field very irregular and contracted; optic nerve whitish. Aug. 1, 1902, visual acuity as follows: O. D. = 6/xxxvi; O. S. = 6/xxiv.

Jan. 5, 1906, returned and gave the following history: Sustained a fall in June, 1905, causing an injury to the head and was unconscious for some hours after the injury. Examination showed V. of O. D. = 6/lx, of O. S. = 6/xxxvi. The visual field greatly con-

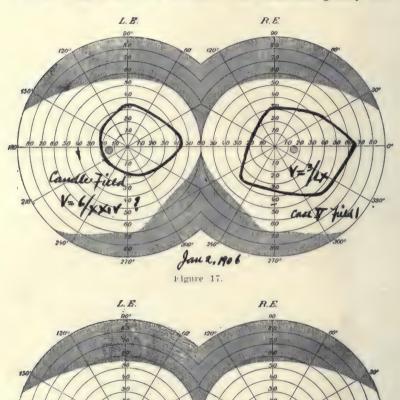
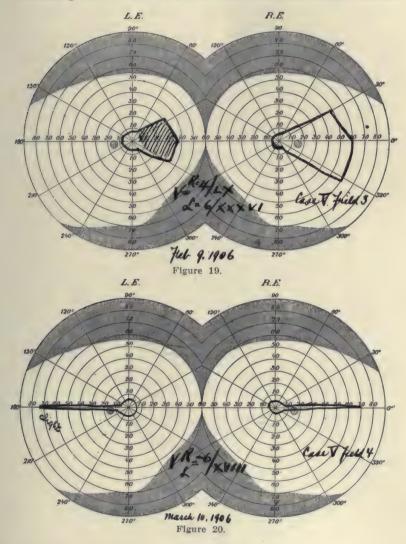


Figure 18.

tracted and vertical nystagmus present. He was given a course of electrical treatments (the combined galvanic and faradic) for a period of ten days, the end of which the V. of O. D. was 6/xviii, vision of O. S. was 6/xviii. Returned home. Feb. 20, 1906, began

the second course of electrical treatment. Vision of the right eye 6/xviii, of the left 6/xviii. After fourteen days' treatment vision of O. D. = +6/xviii, of O. S. = 6/xii. Returned home. July 5, 1906, returned for a week's electrical treatment. $0.^2 = 6/xviii$. On leaving the V. = $0.^2$ 6/xii, and the visual field almost normal.

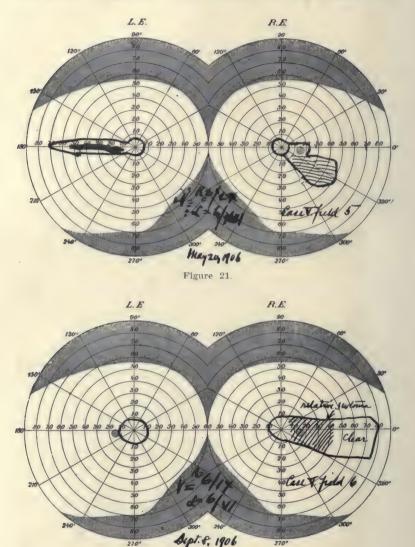


Sept. 8, 1906, same conditions prevailed.

This case demonstrates not only the value of electricity, but, what is more, the lasting effects of this method of treatment.

Case 2.—Miss A. B., age 19, seen for the first time Sept. 24, 1905. Following history was obtained: Congenital lues, sudden

blindness one year ago at menstrual period; some of the sight returned, but on September 23d total blindness ensued after a suppression of menses; a saddle-shaped nose, and other evidences of lues is seen. Diagnosis: Optic atrophy both eyes; patient prac-



tically blind. On September 24th patient was sent to hospital for pilocarpin sweats and large doses of potassium iodid. She could not tolerate the sweats or moderate doses of iodid, so we decided to try electricity and massage. This treatment was given daily. On

Figure 22.

December 20th great improvement was shown and she walked around without stumbling and saw large objects. February 6, 1906, now counts fingers when close to the eyes. June 15th, 1906, counts fingers at ten inches from face. Aug. 24, 1906, counts fingers with right eye at 1½ ft., and with the left at ten inches. November 1st, gradual improvement in sight. Visual field enlarged.

CASE 3.—Mrs. A. W., age 29, a congenital deaf mute. The diagnosis of this case as given by Drs. Brebeck and Hoffman, of Baden, Germany, is as follows: Physiological toxic substances in blood as result of pregnancy, causing a so-called kidney of pregnancy, occasioning, owing to some cerebral predisposition, an increased exudation of fluid in the ventricles of brain and resulting in a neuroretinitis. Our diagnosis was optic nerve and retinal atrophy, both eyes. V. O. D. = movements of objects, V. O. S. = 6/xii. Advised the use of electricity and massage. The treatment was started Nov. 11, 1905, and continued daily thereafter, with the following results: Jan. 22, 1906, V. O. D. = fingers at 1 m., V. O. S. = 6/ix. May 1, 1906, has had electricity and massage three times a week for the past month. She savs she can see a good deal better; visual acuity and visual field shows improvement. V. O. D. = fingers at 1 m., V. O. S. = 6/ix. Has been collecting stamps and comes to the office alone. On June 26, 1906, returned from a month's sojourn in the country. Her condition now is about the same as when she left, except that the visual fields have increased slightly.

CASE 4.-Mr. W. McN., age 56, seen for the first time Oct. 2, 1905, with the following history: Acquired lues with the initial lesion appearing 16 months ago; complains of a gradual loss of sight for past ten days. Visual acuity as follows: O. D. = 6/xxxvi; O. S. = 6/ix. Sent to hospital for pilocarpin sweats, administration of potassium iodid and mercury inunctions; also electrical and massage treatments at the office. Returned home Oct. 20, much improved. Returned for treatment on Dec. 11, 1905, with a neuroretinitis of both eyes, but especially in the right eye. Visual acuity 0. D. = 6/xxxvi, 0. S., 6/ix. Treatment given was as follows: Potassium iodid (teaspoonful of the saturated solution three times a day) and the electrical and massage treatment. Returned home December 20, with improved visual fields and the visual acuity as follows: O. D. = 6/xviii, O. S. = 6/ix., Feb. 10, 1906, V. O. D. = 6/xxxvi, O. D. = 6/ix. After nine days' treatment with electricity and massage great improvement in the visual field and visual acuity. V. O. D. = 6/xii, O. S. = 6/ix. May 30, 1906, returned for a week's treatment, at the end of which

vision in both eyes was 6/ix, and the visual field very much improved.

Case 5.—Mr. T. W., age 68, was first seen April 20, 1905, and upon examination the right eye presented a choked disc. The left eye has a clear pupil, but irregularly dilated, with synechia. The right eye red and inflamed with the pupil small and regular. V. O. D. = 3/lx, O. S. = 6/xxiv. Visual fields contracted. Choked disc O. D. = 3 D. Treatment prescribed was potassium iodid and mercury; sodium salicylate, atropin, and dionin for the iritis, June 5, 1905, V. O. D. = 4/lx, O. S. = 6/xxxiy. Dec. 23, 1905, sent to hospital for pilocarpin sweats, large doses of potassium iodid, strychnia injections in temple, and was given electricity at the office, but no improvement was noted after this heroic treatment. Returned to us Jan. 2, 1906, and we could only obtain a moderate field by means of the candle test. He remained with us until the 24th of January, and received electric and massage treatments daily, with the following result: V. in the right was 6/lx, and in the left, 6/xxxiv; visual field improved. Feb. 9, 1906. after one week's treatment, V. O. D. = 6/lx, O. S. Great improvement in visual field. March 10, 1906, 6/xviii. V. O. D. = 6/lx, O. S. = 6/xvii. April 7, 1906, V. O. D. = 6/lx, O. S. = 6/xviii, with both eyes, 6/xii. May 26, 1906. V. O. D. = 6/lx, O. D. = 6/xviii. June 25, 1906, V. O. D. = 6/lx, O. D. = 6/xii, with glasses and both eyes, V. = 6/vi. June 28, 1906, V. O. D. = 6/lx, O. S. = 6/xii. Aug. 16, 1906, after one week's treatment of electricity and massage a marked improvement in the visual fields noted, V. O. D. = 6/xxxvi, O. S. = 6/xii.

Electricity and massage are of value for stimulation of atrophic structures. The effect gained is permanent if long continued.

By the use of improved instruments the methods are facilitated and should be used by all regular practitioners.

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DISCUSSION.

Dr. Ellett Memphis, said that many labor under a lack of knowledge of electricity. When it comes to high tension and low tension and high frequency and low frequency they get beyond their depth, and as far as he is personally concerned, that has stood between him and the use of electricity. He did not feel like taking it up unless he could use it intelligently. Encouraged by Dr. Coleman's paper, he had had it used for

him by men better prepared, but so far he had been unable to secure the slightest good result in a single case of optic atrophy in which ordinary means of treatment had brought about no good results. Speaking more particularly of the electricity, it has so far failed to give him any good results, but, encouraged by this paper, he will certainly try again.

Dr. Lichtenberg, Kansas City, said that the instrument Dr. Würdemann referred to, built for pneumo-massage treatment, devised by a certain "irregular," was described in the Ophthalmic Record. At that time he was ethical in his practice, but afterward wandered from the straight and narrow path. One of his agents came to Kansas City, and Dr. Lichtenberg had an opportunity of examining the instrument. It was simply an air pump run by an electric motor. He had an instrument built along similar lines to the one described by Dr. Würdemann, having all the variations of pressure, suction, vibration, with and without release. He had treated several patients with the instrument, but in the use of pneumo-massage, with slow or rapid motion, his results were aboslutely negative. Perhaps he was unwise in the selection of his cases, the atrophic process had progressed too far, or possibly some other reason for which he cannot account.

Dr. Willis, Indianapolis, said he had this apparatus used by Dr. Würdemann, and had been using it since hearing Dr. Würdemann's report on its use at Buffalo last year. His experience has been limited in its use, and he is not prepared to report success or failures as yet. Like Dr. Würdemann he had noted that the double eye cupping device applied with Pynchon

pump was often exceeding painful.

Dr. Vail, Cincinnati, said that in his practice he had been using this engine on one eye, and then on the other, alternating back and forth, in conjunction with the galvanic current, the negative over the eye and the positive over the nape of the neck, together with increasing doses of strychnia. In some cases there had been beautiful results, in others the process seems to have hastened. In one case the atrophy went on very much more rapidly than it had been going before, and he felt the method was really harming the man. There was total blindness in two months from the beginning. When the man first came, there was 20/20 vision in one eye and 20/70 in the other. The case was one of tabes with concentric contractions of the visual fields, Argyll-Robertson pupils, and optic nerve atrophy.

DR. WURDEMANN said he fully realized that anybody making a contribution of this kind is placed in the position of the reporter who sends in news which is "important, if true," and that others must go into this before any stock is taken of electrical and massage treatment of atrophies of the retina and nerve. While he is sure he has secured good results in some cases, in others he has had negative results, and he also had the misfortune to have one case progress much faster than it had before the treatment, as

Dr. Vail remarked.

EXTRACTION OF CATARACT WITHIN THE CAPSULE BY EXTERNAL MANIPULATION, THE SO-CALLED INDIAN METHOD.

D. W. GREENE, M.D. DAYTON, OHIO.

Of all the operations that have been proposed for the extraction of cataract from the time of the Daviel until now, no one of them, nor any combination of them offers such a complete and satisfactory disposition of the capsule, which is the beginning, middle and end of about all our after troubles, as that which is the subject of this paper. The undesirability of leaving the capsule behind, and the surgical incompleteness of such a method, have been recognized from the beginning, and the certainty of having to deal with it later to secure a permanent opening through it, has led to trials of methods for extracting the lens in the capsule. The possibility of so delivering it has been known to all operators; nervous and excitable patients by excessive squeezing have often expelled the lens in the capsule during the operation usually with loss of vitreous, but unless the loss has been great these cases usually do well, at least while under observation. What may happen to them subsequently, we have no statistics for determining. The socalled Indian operation proposes a method of extracting the lens within the capsule by external manipulation. It may not be strictly correct to call it the "Indian Operation," because there is in India no unanimity of sentiment regarding it. Most of the operators in that great cataract field have tried it, and many like Herbert. Walsh, Maddox, Pope, Maynard and Neve, while not rejecting the method, reserve it for certain forms of hypermature cataracts, and for those cases in which when the corneal section is completed loss of vitreous threatens. All recognize its strong theoretical claims for recognition, as the operation of choice in a great majority of cases, but they also recognize inherent difficulty in its performance, and dangers to which an eye so operated is especially exposed.

The anatomical arrangement in the attachment of the capsule through the zonula to the ciliary processes is such and the danger of loss of vitreous so imminent when it is disturbed, that men have hesitated to break up these attachments and incur the risks incident to it, and have chosen rather to operate by the older methods, with all their shortcomings. The method has not been extensively tried even in India except by Surgeons Mulroney and Smith. The writer having enjoyed excellent facilities in the eye hospital at the National Military Home, near his home city, and having the

consent of the surgeon, has improved the opportunity for trying the method on a small scale. So far as he can learn there have been only two other operations reported in this country, one in Detroit by Dr. Parker (Ophthalmic Record, April, 1906), and the other has just been reported by Dr. Knapp in March-May Archives of Ophthalmology. These with my own cases make twenty-four. I have followed Smith's description of the different steps of the operation as closely as I could, but not having seen it made by him or anyone else, I have labored under some disadvantages. I have tried to shift from the circular marginal section of DeWecker to that described by Smith, which is practically the old Lebrun section. Theoretical considerations and my own limited experience have satisfied me that the corneal section should be as large as its location will admit of, and should be equal to one-half of the circumference of the cornea at least. The iridectomy should be a broad one. It should be at least six mm, at its base, otherwise the iris pillars are apt to become entangled in the incision and in the end a broad coloboma will result, but from a different cause and by no means so desirable a one and because the temptation to replace and smooth out the pillars of the iris is very great. Vitreous may be lost in the attempt; it was lost in three of my cases in this way. It is at this point that we are advised by Smith "Not to go fiddling and to let well enough alone." But it is hard to let alone a condition that one knows ought to be corrected, and if not correctable because of certain conditions incident to the operation, the method is at fault. Smith does not emphasize these points in any of the articles I have read, in fact he made his first 7,000 operations without iridectomy, but from June, 1904, to June, 1905, he extracted 2,616 cataracts with iridectomy and now advises its routine performance. It is not necessary to go into the subject of iridectomy or its omission, further than to note the growing sentiment in its favor.

Very much of one's success depends on the proper selection of cases. I have not done so in this series, but have taken them as they came, only hesitating to follow it in some eight or ten cases from seeming want of success with others, but after having had this experience, and having read everything accessible to me, bearing on this phase of the subject, I am not able to say which are and which are not suitable cases, as there is no standard to guide one, and certain unknowable conditions of the suspensory ligament before operations are sometimes present, and defeat our purpose. Hypermature cataracts always present capsular complications and are often delivered in capsules by the older methods when the capsule

is so tough that the cystotome will not cut it, or the forceps will not extract the anterior leaf. These should all be extracted in the capsule if possible. Smith rejects a certain proportion of cases as not suitable. This I judge is done from the appearance of the cataract, length of time it has existed and the appearance of the capsule, etc. I would not say that hypermaturity is always an indication for extraction by this method, because there may be present conditions other than hypermaturity which may make us decide against it, either before or during the operation, for example: If the zonula should prove more resistent than the capsule, or certain parts be more strongly anchored, the capsule may rupture before the attachment of the latter gives way, or with a small disciform nucleus, the cortex having been absorbed, delivery may be impossible by the method, and the operation becomes one with capsulotomy.

The anterior leaf of the capsule from its greater thickness and tendency to cell proliferation when diseased, may present a condition in which it is desirable to extract the capsule and lens together.

The writer believes the method has a field of usefulness, and shall continue to practice it in select cases. He has not hesitated to practice it in the slow ripening, nuclear forms, and believes the method is superior to any process of artificial ripening, and if his experience is worth anything, it has shown the possibility and desirability of extracting the whole lenticular body in such cases, and his best success has been in such cases. If this should prove true in the experience of others, it may mark the beginning of a new method in this country of dealing with this most troublesome form of lens opacity, which affects vision early and is usually very slow in ripening, and cannot be extracted by any other method at this stage successfully.

The writer has seen a case in one of the officers of the National Military Home, in which eleven years elapsed between the first appearance of the nuclear clouding and maturity of the cataract. Extraction within the capsule would have relieved this condition at any time without waiting for ripening.

The pressure necessary to express the lens is the danger point, and we have to assume the attainment of a high degree of skill in regulating it, so as not to have loss of vitreous occur in a large proportion of cases. With reasonable care, and sufficient skill the lens can be extracted in the capsule successfully, and it is surprising how often it can be done without loss of vitreous. Not of course with the uniformity that Smith does it, for we must concede to him the highest possible technical knowledge of what he

proposes to do, and the highest attainment of skill in doing it, but still with sufficient success to make the method a desirable one in appropriate cases.

Is it an operation that ought to be generally adopted, as Smith contends it should be, by the average operator and in the average class of cases? I think not, for the following reasons: It is more difficult to deliver the lens in this way than with capsulotomy, even if one be experienced with the method. The operator who only makes ten or twelve operations a year or fewer, cannot from this small number acquire enough skill to do justice to the method or to himself. The operation is not well suited to the very old, nor the feeble minded, as the enforced quiet of the first two or three days is hard to maintain, loss of vitreous is more liable to occur for selfevident reasons, and, in my experience, iris complications and secondary glaucoma have occurred too frequently. According to Herbert and others, visual results have not been better than after older methods. Probably, because of the linear opacity from the low corneal section and its great length, and the astigmatism which it is thought results from pressure of the vitreous on the corneal flaps. I think it is generally accepted that the more peripheral the section the less the degree of astigmatism and the converse should be true.

Smith's articles and statistical tables do not justify these statements, nevertheless they are true in the experience of several Indian operators whose remarks will be reproduced, and in that of the writer.

When the incision is so located as to favor rupture of the suspensory ligament and delivery of the lens by the same manipulation, it requires considerable pressure on the lower border of the cornea and on the posterior border of the corneal flap to start the lens, as it is necessary that the lens in its exit shall describe an arc of 45 to 60 degrees. The principles differ from those of all other operations and the route of exit of the lens also differs. We not only have to deal with the lens but the capsule as well. The distinguishing feature of the operation is the effort made to rupture the zonula and not rupture the capsule itself. This is indispensable to the success of the method. If the capsule ruptures the chief object of the operation is defeated. Major Henry Smith, I.M.S., Jullundar, Punjab, North India, is the only prominent operator, so far as I can learn, who does the operation from choice. He rejects it in certain cases in children and in atrophic forms in adults only. I do not know just what he means by atrophic cataract, surely not the Morgagnian form, for it is in these that the operation is most favorably considered by the majority of operators. Smith

| Case No. | Patient's Name. Date, 1906. | Residence. | Age. | Eye Oper- ated. | Kind of Cataract. | Vitreous. |
|---------------|---------------------------------|--------------------------------|----------|--------------------|----------------------|-------------------------|
| $\frac{1}{2}$ | A. O. S Jan. 4. James K | Dayton, Ohio Soldiers' Home | 56 73 | 0. S. 0. S. | Mature | No loss Small loss |
| 3 | Thomas J. S March 2. | Soldiers' Home | 71 | 0. D. | Immature | No loss |
| 4 | Maggie TMarch 7. | Celina, Ohio | 49 | 0. 8. | Mature | No loss |
| 5 | Adam HMarch 9. | Soldiers' Home | 71 | 0. S. | Immature | No loss |
| | | 1-411 | | | | |
| 6 | Hector H March 9. | Soldiers' Home | 59 | 0. D. | Mature | Small loss |
| | | | | | | |
| 7 | John SApril 3. | Dayton, Ohio | 33 | 0. 8. | Old traumatic | Considerable loss. |
| 8 | Francis BApril 17. | Soldiers' Home | 69 | 0. D. | Immature | Small loss |
| 9 | Robert JApril 17. | Soldiers' Home | 72 | 0. D. | Mature | Small loss |
| | | | | | | |
| 10 | Lorenzo LApril 17. | Soldiers' Home | 70 | O. S. | Mature | Small loss |
| | | | | | | |
| | | | | | | |
| 11 | Simion P. HApril 17. | Soldiers' Home | 63 | 0. 8. | Mature | Insignificant loss. |
| 12 | John DApril 18. | Minster, Ohio | 61 | O. D. | Mature | No loss |
| | | | | | | |
| 13 | John CApril 19. | Soldiers' Home | 73 | O. D. | Mature | Small loss |
| | | | | | | |
| 14 | Sarah HApril 19. | Dayton, Ohio | 74 | O. D. | Hypermature. | No loss |
| | | | | | | |
| 15 | John MApril 27. | Soldiers' Home | 67 | 0. D. | Mature | Presented |
| 10 | | | | | | |
| 16 | Lorenzo L | Soldiers' Home | 70 | 0. D. | Mature | Presented |
| 17 | Jacob W June 29. | Soldiers' Home | 70 | 0. D. | Mature | No loss |
| 18 | Peter WJuly 6. | Soldiers' Home | 64 | 0. D. | Mature | No loss |
| 19 20 | Peter WJuly 20. Jacob FAug. 3. | Soldiers' Home | 64 | 0. S. 0. D. | Hypermature. | No loss |
| 21 | Jacob F | 1 | 70 | 0. D. | Mature | No loss |
| 22 | George P | Soldiers' Home | 62 | 0. D. 0. S. | Mature | No loss Considerable |
| 22 | George FAug. 24. | Soldiers Home | 02 | 0. 8. | immature | loss. |

AVERAGES.

| Age. | Eye Operated. | Kind of Cataract. | Vitreous. | Capsule. | |
|--------------|----------------------------------|---|---|-----------------------|--|
| 64.73 years. | O. D. = 40.6 % O. S. = 59.4 % | Mature = 68.3 % Immat. = 18.2 % Traumatic = 4.5 % Hypermat. = 9.0 % | No loss = 59 % Loss = 41 % Presented9 % | Delivered entire, 50% | |

| Capsule. | Time of Manipu- | Glaucmoa. | Iritis. | Vision. | Remarks. |
|--|----------------------------|---|---|--|---|
| Delivered entire | 3′ 50″ 3′ 40″ 3′ 00″ | Developed March 18. | | With +7.00=18/40 Nebulous cornea. With + 11.00=1/10 With + 11.00=4/10 | March 30. Iridectomy downward. |
| tion. The state of the state o | 4′ 30″ 4′ 10″ | | | With + 8.00 + 3.00 ax 135 = 18/30. | March 31. Hypostatic Pneumonia. Died third day. |
| Posterior leaf left behind. De- livered lens with double sharp hook. | 3′ 55″ | Developed severe at- tack Mar. 18. | | April 13, V = P. L. | Could count fingers at 10 inches without lens before glaucoma developed. |
| Delivered entire | 4' 00" 4' 30" | | Slight, | With +11.00=18/60 With + 11.00=3/10 | Vision estimated. Can not read. |
| Ruptured, part left behind. Discission, June 1. Enlarged incision. | 4′ 00″ 1′ 50″ | | May 15. Severe, May 10. | V = P. L. | Pupil drawn upward, very small, occluded and se- cluded. An iridectomy |
| Delivered entire | 3′ 50″ | Developed April 28. | | | small, occluded and se- cluded. An iridectomy would benefit him. April 21, vomited and wound sprung. May 4, wound closed; anterior chamber not formed. May 10, chamber formed. May |
| Ruptured when 2/3 out, most of capsule removed with forceps. Lens delivered. | 3' 45" | | | With + 11.00=8/10 | 25, iridectomy downward Thick capsule. Needled May 18. |
| Ruptured when 2/3 out, some of capsule left behind. Lens expelled. | 3′ 35″ | | | With +11.00=18/70 | Thin capsular opacity which he refused to have needled. |
| When 2/3 out it stopped, held by adhesion in superior temporal quadrant. Delivered entire by Use of Daviel spoon and strabismus hook. | 6′ 25″ | | Slight, May 20. | With + 12.00=2/10 | |
| Ruptured and part left behind. Delivery almost complete when rupture occurred. | 2' 30"+ 3' 00" | | Developed | May 22. With + 11.00=8/10 | |
| When 2/3 out adhesion became apparent and delivery was made with sharp hook. Capsule ruptured and part remained. | 4' 00" | | • | May 18. With+10.00 = + 3.00 ax 180 = -8/10. | |
| Ruptured and part remained. Lens delivered with sharp hook. Delivered entire | 3' 45" 1' 50" | Developed | | June 8. With + 11.00=3/10 | T=+1. Yielded to eserin. |
| Delivered entire | 3' 00" | July 6. | | July 20. With + 11.00=6/10 July 20. With + 12.00=5/10 | |
| Attempted delivery in capsule. Capsule opened with forceps. Delivered entire | 3' 40" 2' 50" | | | August 14. With + 12.00=P. L. With + 8.00=+3.00 | Thick capsule will be needled later. |
| Ruptured when 3/4 out and part left behind. Delivered entire. | 1' 40" | | | ax 180 = -8/10 | |

AVERAGES.

| Time of Manipulation. | Glaucoma. | Iritis. | Vision. | | | |
|-----------------------|----------------------|----------------------|---|--|--|--|
| 3′ 52.5″ | Developed in 18.2 %. | Developed in 18.2 %. | Vision of those given lenses, 15 in all = 4/10 %+ | | | |

also considers what he calls a semi-gelatinous form as not suited. In the *Indian Medical Gazette* (Calcutta) June, 1900, in the special Ophthalmic number of June, 1901, in *Archives of Ophthalmology*, November, 1905, and in March and May number, 1906, he describes it as follows:

"Having decided that the case is suitable for extraction in the capsule, and the usual preliminaries having been gone through, I make a liberal sized upper incision, inserting the knife at the sclerocorneal junction, just as deep as anatomy and experience teach us will avoid wounding the dangerous area, and cut out in the cornea with a sweep half-way between a normal pupil and the sclero-corneal junction. Then I take out the speculum, and my assistant hooks up the upper eyelid on an ordinary large sized strabismus hook, and draws down the lower lid by placing the ball of his thumb on the skin of the face, close to the lower evelid. He lifts up the upper lid well up with the strabismus hook, and relaxes his hold on neither the upper nor lower lid until the operation is finished. It is important that he should lift the upper lid well up and retain the lower one so well down that the orbicularis muscle cannot be brought into action by the patient until the operation is finished. The importance of a thoroughly competent and reliable assistant in this matter cannot be over estimated. Assuming that the operator is skilled in ophthalmic manipulation, it is the free action of the orbicularis muscle in almost all cases which causes escape of vitreous. I consider it of supreme importance to impress this fact upon anyone attempting the operation. I then place the curve of a strabismus hook over the cornea, about the junction of the lower with the middle third of the lens and a spoon just above the upper lid of the wound. I press the strabismus hook down neither toward the wound nor from it, and do not alter its position until the lens is nearly out, all the time making slow, steady, uninterrupted pressure and counter-pressure. When the lens is more than half way out I, while keeping up the tension with the spoon in its original position, shift the strabismus hook forward and gently tilt the lens by getting the edge of it in the cavity of the strabismus hook. If this latter maneuver be done with the spoon, or other comparatively sharp instrument, or with the slightest roughness or jerk, the capsule will give way and allow the body of the lens to escape, and, if the operator be not dextrous, will itself retract with some contained lens matter, and, being in part dislocated will give trouble in its removal. I shall deal with the removal of such capsule later on. The lens in its capsule being out, the eyelids are let go and bandaged up with the usual antiseptic pad. If a trace of vitreous has escaped, it is snipped off with

scissors, and if the iris prolapses it is replaced before the eyelids are let go.

"When the lens is half way out, or much earlier in the case of couched lenses, a clear point of vitreous will occasionally appear in the wound behind the lens. It is due to the fact that the capsule is unusually strongly anchored in part, and refuses to give way. The moment this clear point appears behind the lens, when it is being expressed, the spoon in the left hand which has been making counter-pressure should be lifted, the strabismus hook in the right hand keeping the lens in position. The spoon should be pushed beneath the lens through the clear point and the lens suspended on it. Once the lens is supported on the spoon the strabismus hook can be used as before to drive out the lens, the spoon merely coming with the lens, but not drawing it out. It will be observed that I use the spoon for the purposes of supporting the lens and preventing it from putting pressure on the vitreous. If we attempt to lift out the lens on the spoon merely, the capsule will give way with exceeding frequency. The maneuver I recommended is in practice an easy proceeding, and prevents undue escape of vitreous."

I have not appreciated all of these details at their full value, and on looking over my series, can recall several cases where accidents have happened and complications followed, that ought not to have happened, and with more experience would not. For example, in two cases where the corneal section was too small a sharp hook was used, when a Daviel spoon would have answered better. In these cases the capsule was ruptured and vitreous lost, and the other accidents could not be avoided as they were dependent on it. But, having admitted this much, I still insist that the operation is difficult of execution and only those skilled in ophthalmic manipulation should undertake it.

This brings us to the conclusion that loss of vitreous is the chief and only real immediate danger in the method because, after excluding primary infection, about all other accidents and complications seem to result from it or are associated with it in the wound.

The writer believes, and experience has justified the statement, that loss of vitreous and incarceration of iris, or threads of capsule, are a serious menace to the future of any operated eye in which they occur, and that, unless advantages commensurate with the increased risk are evident, the method must "remain one of necessity." (Herbert) or be restricted to certain classes of cases. He has had several kinds of accidents in his series of cases, and they have occurred in different types of cataract and under different conditions. Having made upward of 1,000 extractions by older methods, he would hardly be classed among Major Smith's "inexperienced operators."

Yet he has had the accidents named occur far more frequently in this than in any other method of operating, and, in view of the unparalleled statistics presented by Major Smith, is disposed to hold himself responsible for most of them, but he insists that no one, other than Major Smith, could present such an array of statistics, "2,494 extractions and only two cases of iritis and nine failures, all from suppuration." From May 31, 1904, to May 31, 1905, in 2,616 extractions, he gives the following table. "Iritis, 0.3; escape of vitreous 6.8 per cent.; capsule bursting, 8 per cent.; capsule left behind, 4.28 per cent.; first class results, 99.28 per cent; second class results, 0.38 per cent. Failures, 0.34 per cent." A first class result he defines "As one in which a patient has clear vision with aid of lenses plus 11-12 or 13 D. A second class result, not clear vision with spectacles, but clear vision enough to get around. Failures are cases that have gone wrong from any cause." It will be observed that these are not severe standards for measuring visual acuteness, and that a very high per cent. of first class results, and a very low per cent. of second class results and failures is possible under it. How these cases would appear measured by our own standard of 1/10 of normal vision to constitute the beginning of first class results, of course cannot be known; but from what Herbert and others have written, and from my own experience, I would not put first class results above 85 per cent. Second class results I would raise from 0.38 per cent. to 10 per cent., and failures from 0.34 per cent. to 5 per cent., which is the average given by Knapp in Norris and Oliver's System for the average operator with an average class of patients following regular methods, and I know of no reason why the average should be higher after this method and there are reasons why it should be lower.

Surgeon Major F. D. Maynard, I.M.S., says: "Removal of the lens in its capsule as advocated and so successfully performed by Capt. Smith, does away with all difficulties regarding opaque capsule and glutinous cortex. The after results of such eyes need to be followed up and found satisfactory before it will be generally adopted." Macnamara Text Book Disease of the Eye, Fourth Edition, page 425, referring to the removal of the lens in the capsule, says: "This is by no means a new method of extraction of the lens, having been practiced with varying success since 1775 and strongly advocated by Dr. Pagenstecher and M. Sperino. Having performed this operation extensively since 1864 I am convinced that if it were possible in every case upon which we operate to remove the lens in the capsule without damaging the other structures of the eye, we should have reached perfection in the extraction of cataract." It should be noted, however, that the Pagenstecher differs from the

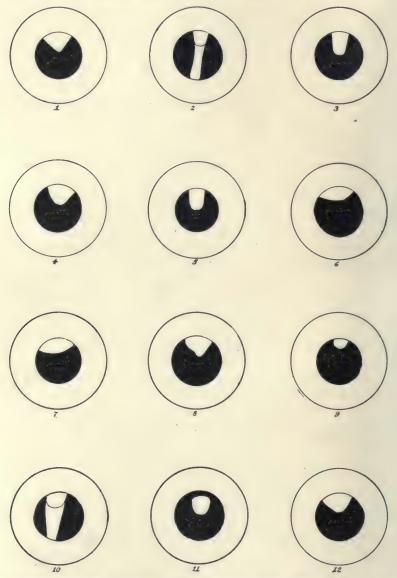
Smith operation, in that in the latter no instrument is passed into the eye to deliver the lens.

Surgeon Major H. Herbert, I.M.S., of Bombay, says: "Extraction within the capsule is with us commonly reserved for over-ripe cataracts in which the capsule is not only opaque, but also too tough to be torn by the systotome." He further says: "I have been surprised and disappointed to find the average visual acuteness obtained by this operation, tested by spherical lenses on discharge from the hospital about a fortnight after operation to be certainly no better and perhaps rather inferior to that obtained by the ordinary operation."

Surgeon Major T. H. Pope, I.M.S., of Madras Eye Infirmary, says: "This is the method that I never now attempt. I have tried often and in many cases succeeded, but just as often I have failed to express the lens." He also refers to certain other operations described in the same journal, of July, 1900. "These have all been given a good trial, but the only conclusion I have arrived at is that there must be something different in the size, formation and firmness of structure of the eyes of the natives of North of India as compared with those of the South."

One of the severest criticisms that can be brought against the operation is, in my judgment, the unsightly appearance of an eye so operated. I have not seen a nice coloboma in more than three cases. It will be remembered that when the lens and the capsule come away, there is nothing to retain and support the vitreous except the hyaloid membrane, and this, I think, may rupture even though vitreous does not escape with the lens. In these cases it is not possible to restore the coloboma to the size and shape it had before the lenticular body was forced through it, on account of the pressure of vitreous, hence incarceration and entanglement or iris results, and displacement of the pupil, and I have seen all the symptoms and results of iritis, except synechiæ, in cases where the lens had come away whole. In three cases glaucoma has followed, two requiring iridectomy and one was relieved by eserin. It is fair to say, however, that in two of these cases, portions of the capsule were left behind. This is too high a per cent, to follow any method of operating. The statement of Treacher Collins in Ophthalmic Hospital Reports, Vol. 16, part 3rd, covers this point. "A common cause of glaucoma after operation is adhesion of the capsule to the incision and pulling of the iris forward so that the angle is encroached on," and the same remarks ought to apply to iris entanglement.

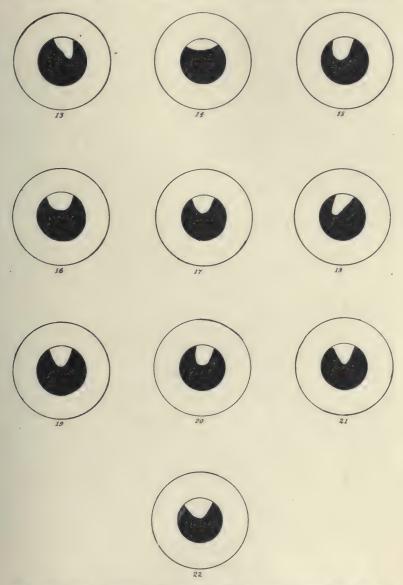
The following diagrams are from drawings made by my assistant, Dr. Brunlin, and myself, and will convey a better idea of the location, size and shape of the pupil (coloboma) in each case than any written description. It will be observed that in Cases 2 and 10 an iridectomy downward was required for the relief of glaucoma. In one case a mild attack yielded to eserin. Cases 6, 7, 9 and 14 will be



benefited by an iridectomy. The drawing from which No. 11 was photographed had a little shading across the upper border of the coloboma to show some capsular remains (the capsule having ruptured). The appearance of the coloboma should not be spoiled by

this, however, for the iris was abscised out to its periphery.

Briefly reviewing what has been so imperfectly written, a few points may be emphasized: First, the operation is a delicate one,



and requires a thorough knowledge of the conditions that may be present and a high degree of skill for its proper performance; second, there is a great fascination in the delicate manipulation necessary to carry out the steps of the operation, and to feel that one

is rid of the possibility of an after cataract. Third, appropriate cases should be selected, when once we have learned what cases are appropriate. Fourth, old shrunken cataracts with thickened capsule can often be delivered by this method, and it is desirable that they should be, but their reduced size adds to the difficulty of delivery and increases the risk of loss of vitreous. High (normal) tension and full size of the lens are an advantage rather than a disadvantage in delivery.

In making the section, allowance should be made for the increased size of the whole lenticular body. The transverse diameter of a normal lens will average about 9 mm., three-fourths that of the average cornea, which in 200 old soldiers I have found to be about 12 mm. That of the cataractous lens is slightly less, to which should be added the increased diameter of the capsular bag and its contents, which more than make up for the shrinking of the lens in ripening. In this series 90 per cent. were males, 10 per cent. females. The right eye was operated in 60 per cent. and the left eye 40 per cent. of the cases, the lens was delivered entire in 55 per cent., vitreous was lost in 35 per cent. Glaucoma followed in 15 per cent. and iritis in 20 per cent, the average time of manipulation was 3 minutes and 59 seconds, and an average of 20/70 vision was secured with correcting glasses.

My purpose in bringing this subject before you has not been to criticise the method, but rather to bring out its strong points (and it has many), and contrast them with its weak ones, which unfortunately, are not few, as they have manifested themselves to me, and try and form an idea of the general applicability of the method to cases as we see them. While cataract is much more common, complications must be much rarer in India than with us, or else the cases are not followed up long enough for them to be met with. This is the opposite of what we should expect from the poor physical condition of the natives and the great prevalence of conjunctival diseases among them. In this way only can we explain the comparative infrequence of wound infection, iritis, and keratoiritis, irido-capsulitis, irido-cyclitis, and pan-ophthalmitis, as shown by Smith's statistics.

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CATARACT EXTRACTION, WITH PRELIMINARY CAPSULOTOMY.

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In the extraction of cataract it is admitted that equal in importance to a corneal section of sufficient size as shall permit of the easy deliverance of the lens is an efficient capsulotomy, equally is it admitted that the latter is the most difficult and dangerous step in the operation. True is it also that the smaller the section consistent with the object in view the better are the patient's chances against infection and for an uninterrupted healing of the wound. To know in advance the size of the section required and to make certain an efficient capsulotomy, with a maximum of precision and a minimum of risk, the writer has used for some years a method which has been satisfactory in results, and to describe which is the reason for this paper. So far as I am aware, no one in this country adopts this procedure, but no claim is made for originality, for somewhere in my reading was obtained a hint from which has been developed the present technique. To those of you who live where hospital facilities and the services of trained ophthalmic nurses are accompaniments of every extraction the preliminary details for preparation of the patient and of asepsis are matters of little personal concern. Of such I beg the indulgence for what in the following may seem supererogatory, but it is offered without excuse to the operator who, removed from such facilities, must work out for himself all the preliminary details and personally supervise them. In the first place, my cataract extractions are done in the office. I am prepared for criticism on this point and am free to confess that it is not the ideal method, but where one contrasts the makeshifts of improvised operating tables, kitchen-stove sterilizers, insufficient illumination, etc., outside, with the perfect arrangements within a well-equipped office, one will decide that the patient's chances are better under the latter conditions. More than this, there is a psychic element in the case—unfamiliar surroundings distract one from that concentration of attention and alertness of mind so essential to smooth operating. If possible cataract cases are kept under observation for a week preceding the operation. It is assumed that systemic diseases and chronic conditions of the lacrimal apparatus and conjunctiva requiring longer treatment are excluded. Also it is understood that the method to be described is applicable only to such cases as one would intelligently select for the

simple extraction and is not the operation of choice where the iris lacks the lustrous appearance of health, where the lens is amber colored or dark gray, and when the iris is rigid with little dilating ability to the pupil. Without going into the vexed question of the merits of the simple as compared with the combined extraction as a routine procedure, it is my opinion that 95 per cent. of all cases are suitable to the former operations, and that the chief objections to this, namely, the difficulties of an efficient capsulotomy, the effective removal of fragments of cortex and the easy deliverance of the lens through the pupil are met by the method here proposed. As to the better cosmetic and visual results, there can be little question. Since Lister's discovery, "antisepsis is everything" has become a familiar saying, and now few other preparations are made than those which will ensure asepsis and antisepsis. If, perchance, notwithstanding these precautions, infection occurred, it was said that it was due to faulty antisepsis, allowing the wound to become infeeted by pathogenic germs from the outside. Most operators occupy themselves with exogenous invasion alone, paying little attention to sources of endogenous infection. I am of the opinion that the latter play an important part in the healing of operative wounds, so during the week of observation the patients are kept on a non-nitrogenous diet, a daily warm bath is ordered and the bowels kept flushed by a morning saline draught. The nostrils are kept clean by the use of mild alkaline washes, and to the conjunctiva is applied thrice daily a 5 per cent. solution of argyrol. On the afternoon of the day preceding operation the patient, if a man, is shaved, his hair cut close and given a shampoo. A woman has her hair washed. The cilia are cut close to the lid margin, the brow is shaved, the skin of the lids, cheek and brow is scrubbed with soap and hot sterile water, washed with ether, again with water and lastly with a 1-2000 bichlorid solution. The pupil is dilated with a 1 per cent. solution of homatropin, the conjunctival sac is flushed with a 1-1000 alphozone solution, filled with sterilized sublamine vaseline, 1-1000, and a dry dressing of bichlorid gauze applied, held in place by a sterilized bandage. This is kept in place over night. In this connection it should be emphasized that no degree of chemic antiseptic can make bungling surgery aseptic, and it is much better to have the cataract knife superlatively sharp than superlatively clean. In the morning the dressings are removed, the technique of asepsis again carried out and the eye cocainized. A speculum is introduced and the fixation forceps applied. With a small Knapp's knife-needle a puncture is made through the upper part of the cornea, the blade carried down to the lower margin of

the dilated pupil and then brought to its upper border, making an incision not only through the capsule, but partly into the lens substance itself. A similar cut, but at right angles to this, is then made in the mid-pupillary space and the knife withdrawn. The speculum and fixation forceps are then removed, the eye flushed with an antiseptic and the bandage reapplied. It is here that most valuable information is obtained which will guide the operator in the size of the corneal section he will later make. If the cut in the capsule is practically invisible, then is it known that a large nucleus is present and the usual section of the upper two-fifths of the cornea will be required for the easy exit of the lens. If there occurs an escape of semi-gelatinous lens matter, then a section of one-third will suffice, while if there issues a milky liquid then is it known that the cataract is hypermature and the section may be made with the angular keratome. Therefore, no larger a section is made than is necessary and a minimum of risk to the healing process assured. There is a period of waiting between the capsulotomy and the extraction, because there is usually a sufficient loss of aqueous to render the eye soft and a proper corneal section difficult. I am of the opinion. however, that this loss of time is really a gain in results, for it seems that even in four hours there is sufficient imbibition of aqueous to facilitate the separation between cortex and capsule and to make easier the deliverance of the lens. The final steps in the operation do not differ from those usually employed. Twenty-four hours have elapsed since the homatropin was instilled, and the pupil is now in a condition to respond to miotics. A fourth grain of morphia is given hypodermically a short time before the last operation. There are several advantages in doing this. It allays nervousness, makes the patient more tractable, controls to a large degree the subsequent smarting and finally tends to contract the pupil and prevent prolapse of the iris. Perhaps no condition so favors exactness as does perfect illumination of the site of operation. Therefore, I have the light from a McKensie condenser still closer focussed on the eve through a reading glass and wear an electric headlight. Thus is obtained a brilliant, direct and oblique illumination in which nothing can escape observation. A fixation forceps without a catch is used, because the instant the section is complete its purpose is accomplished and it is removed. Furthermore, it is the safer instrument, as not infrequently the lens comes out so easily that it follows the blade incident to the slight pressure exerted by the fixation forceps and the back of the knife. A Lippincott irrigator is kept ready for use, but rarely is it required. The toilet of the wound is quickly accomplished, for there can be

no tags of capsule to engage between its lips. The conjunctival sac is flushed with an antiseptic, the lids smeared with the sublamine vaseline and a dry dressing applied, held in place by a figure-ofeight bandage. Over this is placed a Ring's mask, and the patient reclines upon a sofa for an hour before being sent home. In conclusion, any variation proposed in an operation which has been so thoroughly elaborated as has cataract extraction must possess decided advantages if it is to be accepted, and must overcome difficulties inherent in the usual method. The disadvantages of the procedure herein detailed may be summed up in a sentence: It requires more time and trouble, as the technique of asepsis must twice be gone over, and it involves another wound in the cornea, but as this is a mere puncture it is of no consequence. Its advantages are many. In the ordinary capsulotomy some of the difficulties are inherent in the instrument itself, but more and greater ones in the conditions under which it must be used. The straight capsulotome is kept sharp with difficulty. It cuts only when drawn toward the operator; at right angles to this it simply scratches. As soon as the section is made the iris contracts, the lens comes forward and the anterior chamber is abolished. Into this narrow space must be passed a straight instrument between cornea and lens; it is impossible to do this and reach below the equator of the lens without pressing it more or less backward, and at this stage the lens, held only by its suspensory ligament, is mobile and easily dislocated. More than this, the operator, in his zeal to make an efficient opening in the capsule, is apt to rupture this ligament and loss of vitreous ensues. There are no means of knowing that the capsulotomy has been inadequately performed until the lens, when pressure is applied to the globe, refuses to come forward. In this event, then, either the fixation forceps must be reapplied, a difficult and dangerous thing to do on an opened eye, or the cystotome reintroduced without its help, trusting to the patient keeping still. The pupillary space being narrowed by the contraction of the iris leaves insufficient room to work in and it is a difficult matter not to wound the iris or entangle it in the tip of the instrument. If the bent cystotome of Knapp is used, then are these difficulties enhanced, and not only are there greater difficulties in removing fragments of cortex, but a peripheric capsulotomy leaves two thicknesses of lens capsule in the pupillary space and more often is required a secondary operation. Should blood enter the anterior chamber, then are the difficulties before mentioned further increased. None of these difficulties accompany a preliminary capsulotomy: 1. The knife needle can be made superlatively sharp

and efficiently cuts the capsule in both directions. 2. Only through the grossest carelessness can the suspensory ligament be ruptured or the lens dislocated, for it is held firmly in place by the vitreous behind and the aqueous in front. 3. Ample space is given through the dilated pupil, and the point of the knife may be kept fully in view during the division of the capsule, and, furthermore, the operator has the satisfaction of knowing that this is perfectly accomplished. 4. The iris can not be wounded or entangled in the instrument and there can be no bleeding to obscure the field of operation. In brief, it simplifies and makes certain a step in the operation which is usually fraught with difficulties and dangers.

DISCUSSION

OF PAPERS BY DRS. GREENE AND SMITH.

Dr. Hubbell, Buffalo, said that he had had no experience in the so-called Indian method. After learning the results he was not encouraged to try it, for he felt its results are not as successful as are those he and others had had by other methods. According to Dr. Greene's statistics, he has failed to deliver the lens without rupturing the capsule in 45 per cent. of his cases, leaving only 55 per cent. in which the lens was brought out in its capsule. There were 35 per cent. of the cases in which the vitreous humor was lost. That is a very high percentage and he would hesitate to expose his patients to such a risk. Moreover, so large a proportion of his cases have glaucoma, that this, too, becomes a discouraging feature of this operation, as it is far in excess of that of other methods. Greene has unusual opportunities for experimental work of this kind, and his conscientious work in putting to the test a much vaunted innovation is greatly to be admired. Dr. Hubbell regrets, however, that his results, as well as those of others, do not commend this method of extracting cataract more favorably to the profession.

Dr. Edward Jackson, Denver, said that while all are interested in all proposed modifications of cataract operations, very few will modify their own practice in the way suggested. It is well to know what may be done in certain emergencies. He imagined that is the chief benefit to be expected of the Indian method and of the modification that Dr. Smith proposes. He had not operated by the Indian method, although he has extracted a few lenses in the capsule. He would generally prefer that the patient should have the posterior capsule in the eye after cataract extraction, rather than that he should be free from it, even admitting the good results reported by Dr. Smith. Dr. Jackson does not fear secondary operations as many do, and thinks there is a positive advantage to a great many elderly people in having the capsule in the eye. The vitreous is often considerably disorganized, and the eye is safer if it is protected by the capsule.

With reference to Dr. Smith's suggestion of preliminary capsulotomy, Dr. Jackson has not made it as he suggests, waiting for some hours to complete the operation. Several times he has done a preliminary capsulotomy, one recently in a case of traumatic cataract with extensive synechiæ. The other eye was lost. There were particles of sand in the lens that he wanted to get out, and the conditions were not favorable to get a free opening afterwards. But when he has done this it is always at the time of the operation. He would have no hesitation in waiting some time if necessary, when he attempted to open the capsule before making the

corneal section, but he had not found it necessary. Making the opening in the capsule with a Knapp knife needle, he has little trouble in loss of aqueous. Without having had to prolong the cocain anesthesia, the operation has progressed smoothly. In needle operations he has frequently inserted the needle twice in order to get good access to the capsule. It is a risk to leave the patient with an incomplete operation. The possibility of something happening to the operator or to the patient would make him loath to adopt this as routine practice. He does not agree that there is any difficulty in getting a sufficient opening in the capsule. In doing simple extraction the cut is very small, yet he has never felt there was any necessity for preliminary capsulotomy to get a free opening in the capsule. He feels that these operations proposed are of value in the way of suggestion as to what may be done. In a case in which an ophthalmologist of small experience attempted to extract a lens and did not succeed, Dr. Jackson was called by wire and completed the operation some five hours later, and the case turned out well. The incision was not long enough.

Dr. Reber said he had no experience with preliminary capsulotomy. At the Boston meeting of the American Medical Association he spoke of 4 cases (operated 11 years ago) of extraction of the lens in its capsule through the intact pupil without iridectomy. That is an operation that he does not think anybody ought to do. He did four of them; three were as beautiful as could be, with absolutely perfect result, with vision of 5/5, 5/6 and 5/10. The fourth patient is wearing a glass eye. He was simply appalled at 33 1/3 per cent. of vitreous loss reported by Dr. Greene. Herbert himself speaks of the large percentage of vitreous loss in the Indian method and Marshall comparing three series of cases, each embodying 293 cases (simple, combined and Pagenstecher) shows figures that vastly favor the simple operation in his hands. He does not mention the order in which these series were performed, which would be of great value, as he would naturally exhibit much greater skill and more nearly perfect technic in the series last done.

Dr. WÜRDEMANN hoped that Dr. Greene, with his exceptional advantages for after observation of cataract cases, will be able to report next year at least a hundred of these cases, because it is only by such a number that proper comparison can be made with the results of the ordinary methods of cataract extraction. The results given by Major Smith and Herbert compare favorably with those of ordinary extractions, but it must be remembered that those patients are Indians, similar to the savage animals, in that suppuration seldom occurs and that they left the doctor six days after the operation and the end statistics are not obtained. In the October number of Ophthalmology Miles Standish reports 3 cases, Cheney, 9 cases. The latter lost one. Dr. Würdemann has done 9, 4 before the statistics of Herbert and Smith. In these nine eyes he lost vitreous three times, almost the entire vitreous in one eye. The operation is not one of choice, but of selection in cases of slowly progressing cataract in persons over 50 years of age, and in hypermature cataract. In removing the lens by this method it takes one to three minutes before the capsule gives way.

Dr. Valk, New York City, said he thought that 15 or 20 years ago St. John Roosa, of New York, attempted to perfect an operation for the removal of the lens in its capsule. After he had made the incision in the cornea, he would turn the back of the knife downward and make strong pressure on the center of the eyeball. Dr. Valk was then in service at the hospital and at Dr. Roosa's request tried this method on a number of cases, but he thinks in the majority of them he had a loss of vitreous,

and there were few, if any, which he would call a good result. There was a certain amount of incarceration of the iris into the section. He does not think it justifiable to attempt this operation on patients. He asked Dr. Greene if his patients are not going to suffer from incomplete healing of the wound. It looks as if they will have cystoid healing. In regard to the capsulotomy, he has not tried Dr. Smith's method because he does not like it. In his own capsulotomy he makes a complete circle with his cystone, about a millimeter beyond the pupillary area, when the iris is not dilated. He thinks, in some cases, the anterior portion of the capsule is removed. In looking over his old statistics, he seems to have less operations for secondary cataract than are reported by others. This he attributed to the capsulatomy.

Dr. Schneideman, Philadelphia, said that in connection with extraction within the capsule, it is of interest to recall certain attempts by an early ophthalmologist, Beer, who in 1819 tried to extract the lens within the capsule by introducing a needle into it; he attempted to release the lens from its connections by turning the needle. As the lens system is too intimately attached to the ocular coats, the result was a more or less extensive detachment of the latter from the sclera, with a loss of 19 out of 20 eyes so treated. As regards the Indian operation, Major Smith compares the operative procedures to those of a mechanical trade, like horseshoeing; as it would be impossible to teach anyone how to shoe a horse from a written description alone, so he urges that those who desire to learn his method should come and see him perform it, it being impossible to learn it from description.

Dr. Greene, Dayton, Ohio, said he thought he had shown enough to prove that his opinion of the Indian method is not the most favorable. His object in this series was for its scientific value. He had the material, and having that opportunity he felt it his duty to do it the best he could. He is not favorably impressed with it, and hereafter he will make very few of them. He is not sorry that he made this investigation. He has not lost an eye in this series of 22 cases. There is but one patient who has only perception of light, and he has consented to have an iridectomy. Another thing, this report is absolutely true; that is more than can be said of a lot of things. When he reads an article which states that of 2,616 cataract extractions there were but two cases of iritis, he does not believe it—no one will believe it. He has made about 1,000 extractions and has lost vitreous in 35 per cent. In some he lost it because he did not follow directions. In reply to Dr. Valk, cystoid healing does not obtain in the cornea.

ON THE COLLOID EXCRESCENCES AND THEIR IN-FLUENCES ON THE OSSIFICATION OF THE CHORIOID.

ADOLF ALT, M.D. ST. LOUIS, MO.

In a paper entitled "On the Colloid Excrescences of the Lamina Vitrea as a Starting Point for the Formation of Bone," published in the Archives of Ophthalmology and Otology, vol. vi, page 34, I described several specimens in which I was satisfied I had seen an undoubted formation of bone in colloid excrescences of the chorioid. I had no explanation to offer as to "how this process took place, nor whether the colloid excrescences became ossified before or after other parts of the chorioid." (l. c.) Having, however, observed the fact in a number of cases, I thought it important enough to be put on record and I ventured the opinion that such an ossification of colloid excrescences might be the starting point of bone formation inward from the lamina vitrea of the chorioid.

These statements were received with incredulity, since no cells which could form bone were present in the colloid excrescences, and, furthermore, they have been misquoted in various ways. I have not taken up the study of this interesting question again, until I found that J. H. Parsons, in the second volume of his excellent Pathology of the Eye, also described ossification of colloid excrescences.

Acting on this stimulus, I have again studied my numerous specimens of colloid excrescences and bone formation within and near the chorioid, and, while this study is not brought to an end as yet, I thought some of the points might be of interest to this society.

In searching for the first signs of the formation of colloid bodies, I found that near larger colloid bodies numerous pigment epithelial cells can be seen, which contain some smaller and some larger droplets of colloid substance in their protoplasm. These stain exactly like the larger excrescences. In transverse sections such cells appear enlarged, their pigment is pressed inward by the increased contents of the cell, and their nucleus, though it does not take up stains quite as well as in the norm, seems but little altered (Fig. 1.). Gradually these cells swell more and more and two neighboring ones, at first still separated by a trace of pigment, will finally coalesce (Fig. 2). At this stage the nucleus takes up but very little staining material. The presence of these pathological cells seems in some way to produce a new formation of pigment epithelial cells, which grow over the pathologic ones, and thus the smallest colloid bodies are covered with a continued layer of pigment epithelial cells.



Fig. 1.—Shows two neighboring pigment epithelial cells undergoing a colloid metamorphosis. In one the nucleus, though but slightly stained, is plainly visible.



Fig. 2.—Two neighboring pigment epithelial cells in process of coalescence. The nuclei are almost invisible. Newly formed pigment epithelia cover these metamorphosed ones.

Soon, however, even these cells may undergo a colloid change, and when they coalesce with the underlying ones, larger colloid bodies result (Fig. 3). This process I have seen in chorioids in which



Fig. 3.—More and more cells, covering those originally affected are seen to undergo the same metamorphosis.

the lamina vitrea was still in existence, but, and that is a very important point also, in a number of eyes in which I could find no trace of a lamina vitrea.



Fig. 4.—The pigment epithelial cells are nearly all destroyed or have fallen off. Thus a picture results which looks as if the colloid excrescences were simply a thickening of the lamina vitrea.

In this manner, by further and further addition of cells, undergoing the colloid metamorphosis, finally quite large colloid excrescences are formed, often large enough to be seen clinically with the ophthalmoscope and in sections with the naked eye.

A large number of sections showing the earliest and earlier stages

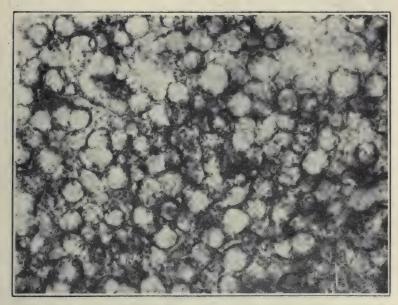


Fig. 5.—Choroid, of the injured eye of a boy 12 years of age, studded with colloid excrescences.



Fig. 6.—Shows the immigration of connective tissue cells into a colloid body while the latter is being found.

of this process, which I have studied, would, therefore, tend to prove that probably the "transition theory," rather than the "depo-

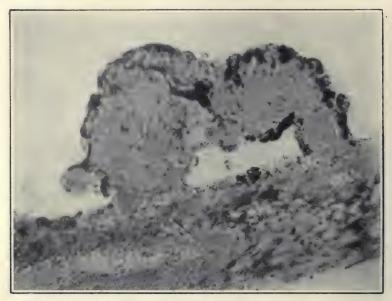


Fig. 7.—Two large colloid excrescences coalescing, numerous connective tissue cells can be seen lying within them.



Fig. 8.—A small plate of osteoid tissue in a colloid excrescence surrounded by connective tissue cells.

sition theory" of Parsons is correct. Pictures, however, are not wanting in which the cell structure and most of the pigment having disappeared, the remaining transparent colloid substance appears simply as a swelling of the lamina vitrea (Fig. 4). But it appears that this is not a correct view, and that such pictures, which, by the way, are rare, are rather a deception than the truth.

The process which I have described is the one usually found in eyes in which there is no violent inflammation and cell production going on, and the result seems to be a sometimes enormous quantity of colloid warts, so that the whole inner surface of the chorioid may be studied with them (Fig. 5). Parsons states that cells may wander into these excrescences and there form bone, after the rupture of the underlying lamina vitrea. It does not seem



Fig. 9.—A large plate of osteoid tissue between the original and a newly formed layer of pigment epithelium; the gap in the original layer may have been at the site of a former colloid excrescence.

that this statement can be doubted, and I think this is probably the explanation of the cases I described some thirty years ago.

I have, however, found another explanation of the occasional formation of bone in colloid excrescences which is still more simple and, therefore, perhaps, the more natural and frequent.

In eyes with a violent inflammation and cell production in the chorioid the lamina vitrea disappears, so that often in many sections no trace of it can be found. When in such an eye colloid excrescences are formed by the colloid metamorphosis of pigment epithelial cells and their coalescence numerous connective tissue cells are seen to wander into colloid excrescences from the start, so to speak, while it is forming. Thus, such excrescences, while sur-

rounded with metamorphosing pigment epithelial cells, contain in their colloid substance numerous dying pigment epithelium nuclei and nuclei of connective tissue cells, which probably have the faculty of becoming osteoblasts (Fig. 6, Fig. 7, Fig. 8).

I have found such excrescences in which patches of osteoid tissue could easily be distinguished, and it seems that in these excrescences all substrata for a future bone formation are furnished from their very beginning and no invasion of the finished colloid mass by cells at a later date in their existence, and after a rupture of the lamina vitrea, need be assumed for the explanation of bone formation in these excrescences.

From the foregoing it seems that the ossification of colloid excrescences in one or the other is proven. Whether, however, such ossified excrescences may form the starting point of bone formation on the inner side of the lamina vitrea or not, is not easy to decide. I am now rather inclined to doubt it. And yet, I have some specimens in which on the partially preserved lamina vitrea a thick layer of osteoid tissue lies between two layers of pigment epithelium cells, with a break in the underlying layer where the original colloid excrescence might be supposed to have been situated (Fig. 9). Such specimens seem to prove the possibility of larger plates of bone tissue springing from, or at least being formed, in connection with ossified colloid excrescences.

I have purposely in this paper refrained from making any reference to numerous other points of interest connected with the colloid excrescences, most of which are well known and have been previously described by others and myself. Only one further statement I wish to add, that is, that while many eyes containing colloid excrescences contain no bone, no eye with bone formation, in which the ossification was not too old and had not yet destroyed all other features, that I have examined, was devoid of colloid excrescences. Thus it does seem that there is a certain relation between the two processes when the proper conditions exist in the eye.

The observations here recorded and illustrated by photographs made from the specimens may, I hope, be a step forward in the understanding of the manner in which these interesting phenomena are brought about.

DISCUSSION.

DR. ROBERT SCOTT LAMB, Washington, D. C., said that remembering the fact that endothelial tissue may take on a developmental or degenerative type, or that it may build up, forming cartilage or bone, or degenerate, giving hyaline or colloid degeneration, and that as the simplest form of cell is the fibrous cell, and from that either fibrous areas or bone areas are formed. Then the process of building up is very easily understood.

In the case of foreign bodies, Dr. Lamb had one case in which a percussion cap had been in the eye for 20 years. There was a complete bone formation, running right around in what had been the choroid from one ciliary process to the other, $\frac{1}{18}$ to $\frac{3}{16}$ of an inch thick, very firm all the way through and calcareous. This is particularly interesting from the pathologic point, which some are interested in.

Dr. Case, Elmira, N. Y., said that these cases are interesting from several standpoints, one of which is sympathetic trouble in the other eye. Cases that he has observed, all resulted from perfunctory injuries to eye-

ball. Ossification of choroid was found in each case.

SPONTANEOUS DISLOCATION OF BOTH CRYSTALLINE LENSES IN TWO MEMBERS OF THE SAME FAMILY.

ALVIN A. HUBBELL, M.D., PH.D.

BUFFALO, N. Y.

Heredity is well known to be an etiologic factor of more or less influence in many diseases of the eye, but so far as my observation and research go this has not appeared to be the case in dislocation of the crystalline lens. I therefore submit the following cases as showing the possibility of such influence in this disease:

Case 1.—In 1886, Mrs. J. D., 38 years of age, consulted me for loss of vision of her left eye. The vision of this eye had been failing for several months, and during the last few weeks it had become very dim, but without pain or soreness. The vision of the right eye was normal, and there was no refractive error. Both eyes presented a normal appearance, by inspection, except that the left anterior chamber was very deep and the iris was tremulous on ocular movements. Both irides were of the same color, both pupils were of the same size and reacted equally to light. On dilating the pupils with homatropin, the ophthalmoscope showed the right fundus normal in every respect and the media clear. The refraction of this eye was nearly emmetropic.

The left eye was aphakic in appearance and also in refraction. The crystalline lens was found in the lower part of the vitreous humor behind the ciliary body, and seemed to be fixed. The posterior part of the fundus was seen distinctly with the suitable lens of the ophthalmoscope, and was normal. With a + 9.00 D. Sph. glass the vision of this eye was 20/30, Snellen. No glass was ordered for either eye, the patient being advised to depend on her right eye alone.

There had been no injury of any kind to the left eye so far as the patient knew, and the patient's general health was good. There was no history or evidence of syphilis, and there had been no disease or inflammation of the eye previous to the present condition.

About six months after the above consultation, the patient returned to me with the complaint that the vision of the right eye had just begun to trouble her. There had been no injury. On examination I found that the vision had become much impaired, and that at certain times and in certain positions of the eye she had diplopia with it. The anterior chamber had become abnormally deep, but the iris did not appear to be tremulous. After dilating the pupil I found the crystalline lens partially dislocated directly downward into the vitreous humor, the upper margin of the lens being just below the visual axis of the eye. The lens was nearly, if not entirely, transparent. With a + 9.00 D. Sph. glass, the vision was raised to 20/30. I ordered at this time a + 9.00 D. Sph. glass for each eye, which gave clear binocular vision of a little better than 20/30. I did not order reading glasses at this time. A few weeks later I found that the right lens had sunk to the bottom of the vitreous humor, like that of the left eye, and that it appeared to be fixed. The iris was tremulous. There were no symptoms of irritation in either eye and the patient was perfectly comfortable. I now ordered R. and L. + 12.00 D. Sph. glasses for near use, with which she read Jaeger No. 4 at twelve inches.

With these glasses vision continued about the same for several years. There was no change in the position of the crystalline lenses, and no inflammatory reaction occurred. I have not seen the patient in eight or ten years, but a recent letter says: "She does not see well. The sight of one eye is gone and the other impaired." This is another illustration of the undoubted injurious effect of a crystalline lens in the bottom of the vitreous humor.

CASE 2.—Mrs. L. B., sister of the above, first consulted me in September, 1890. She was then 39 years old and had had trouble with her right eye for four years. She had always been in good health, had no history of syphilis or other previous disease, or of injury of either eye. During these four years she had been treated, among several, by Dr. Phillips of Cleveland, Ohio.

On examination I found that the right eye had been inflamed and painful more or less during the past year, and was still red and tender. The cornea was somewhat hazy and the crystalline lens, which was opaque, was dislocated into the anterior chamber. The tension of the eyeball was considerably increased, and vision was reduced to barely perception of light.

The left eye had had a wide iridectomy performed upward, by Dr. Phillips, of Cleveland, Ohio, about six months before. The lens of this eye was now cataractous, and was partially dislocated downward and outward. The vision through the coloboma above the lens

was sufficient to enable her to go about. There had been no inflammation of this eye; until a year previously its vision had been "good."

The patient would not consent to any attempt at removal or reduction of the right lens, as I was unable to promise a successful result. But she was willing that I should "couch" the left lens. A few days afterward, therefore, I depressed this lens by passing a cataract needle through the outer margin of the cornea onto the anterior face of the upper part of the lens and gently pushing it down to the lower part of the vitreous humor. It remained there, but the operation was followed by a slight reaction, which subsided in a few days.

On October 9, the eye was quiet and with a + 12.00 D. Sph. glass, she had a vision of 3/9, Snellen. With + 16.00 D. Sph., she could read Jaeger No. 4 slowly at seven inches. I ordered corresponding glasses. On June 20, 1892, the vision of this eye with the same glasses was 5/9, nearly, and Jaeger No. 4.

I have not seen the patient since, but a letter recently dictated by her says: "My entire vision failed me about seven years ago. My eye does not hurt me." She also states that the other (right) eye had been enucleated.

The fact that these two sisters are both afflicted with spontaneous dislocation of both crystalline lenses is very suggestive of some hereditary condition existing, by which those peculiar degenerative changes of the suspensary ligament have taken place which are necessary to this rare form of lenticular luxation. I have not had the opportunity of tracing the family history, but that such a hereditary influence is present is rendered still more probable by the following suggestive statement in the letter above referred to, which would indicate the possibility of other cases of the kind existing in this family: "In three generations there are thirteen blind, and others with impaired vision." Mrs. B. thinks this state of affairs may be due to "relatives intermarrying."

DISCUSSION.

Dr. Thomas Faith, Chicago, said he had a similar experience. Two sisters between 30 and 40 had spontaneous dislocation of both crystalline lenses which have undergone some changes. There is a cataract in the case of the mother and of an aunt. In addition to this, there is a third sister who has a cataract. He looks on the condition as one of heredity.

A STATISTICAL INQUIRY AS TO THE RELIEF AND CURE OF MIGRAINE BY THE CORRECTION OF ERRORS OF REFRACTION.

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CLEVELAND, OHIO.

It ought to be superfluous to present such a paper as this to the Academy, and yet it seems necessary when as recent a book as Posey and Spiller on "The Eye and Nervous System" permits unchallenged the insertion of such statements as the following:

"Originally the term ophthalmic migraine was used to bolster up a theory of the causation of the disease. This theory was that of Piorry, who held that migraine may be caused by overstrain of the iris and overstimulation of the retina. Here we have a very early statement of the theory of eye-strain, which has since been worked up to such good purpose by some specialists."

"By much the same process of logic it would be possible to prove that eye-strain is responsible for locomotor ataxia, or for cancer of the womb, or, in fact, for any disease which happens to appear in a patient who has a little astigmatism."

"The treatment of migraine is entirely symptomatic and expectant. There is no specific for the disease. In our ignorance of the pathology of the affection, our treatment can be nothing more than empirical; and this fact is proved, as in all similar cases, by the large number of remedies that are recommended and even lauded in excess. From quack nostrums to spectacles the list is a dreary one and will not be repeated here."

It is the repetition of such absurd statements ad nauseam that makes the reading of such papers as this necessary, and I beg the Academy's pardon for again thrashing out this old straw.

I have always thought that migraine was usually an eye head-ache. As long ago as 1887, in *The Medical Record*, I reported a case of migraine cured by the correction of an error of refraction. In 1890, in a paper read before the Section on Ophthalmology of the A. M. A. on functional nervous diseases of reflex origin, I called attention to headache and gastrointestinal disturbance as a result of eye-strain. In an address before the Cleveland Medical

^{1.} The Eye and Nervous System, pp. 702 and 703.

^{2.} Ibid., pp 726-727.

^{3.} A paper on "Headache and Other Reflex-nervous Troubles as the Result of Eye-strain," with six illustrative cases, Aug. 22, 1887.

Society⁴ in 1895, I said, "I have put first under headaches of eyestrain that of migraine, ordinary every-day sick headache. Last night, instead of writing this paper, as I ought, I spent much time trying to find something in the books about migraine. In none of the text-books could I find the eye mentioned as a cause of sick headache. They describe all sorts of ocular symptoms, of haloes, of temporary blindness, of luminapara, speak of mysterious causes, and elaborate difficult and obscure nervous conditions of hyperemia and anemia, but never suggest that the eyes may cause it.

I believe that the ordinary sick headache very frequently has its origin in eye-strain. I could recite cases by the score of sick headache that have been cured by spectacles. Put on the glasses and the headache disappears, take them off and it returns. A school teacher here in town had headache Friday afternoon as regularly as the Friday came. She was in bed all day Saturday and often unable to go to church on Sunday. On Monday she went back to school and did the work pretty well all week, but on Friday afternoon the headache came back and incapacitated her for all mental or physical work for one, two or three days at a time. She put on a pair of glasses and she did not have a headache for two years. One day she broke her glasses; spent several hours in reading, and the next day had a sick headache. That migraine is caused by eye-strain is a fact I hope you will carry home with you."

In view of these published statements, I may be accused of being a prejudiced observer, and in so far as mental suggestion may be credited with affecting a cure I am willing to concede that I have always assured my patients that the correction of their error of refraction would almost always mitigate, if not entirely cure, their attacks.

In view of the great diversity of opinion entertained by the medical profession as to the curability of migraine by correction of errors of refraction, I thought it might be not only interesting, but profitable, to determine the question from the patient's point of view.

Every one knows how unreliable the testimony of a layman is upon medical matters, and yet there is scarcely one so dull but that he knows whether he has been cured of a migraine or not. After sending a number of test letters of inquiry, I found that I would be obliged to ask a few simple questions, and finally sent the following:

"There seems to be a question in the minds of physicians as to

^{4.} Reported by J. S. Cadwalader, stenographer, and published in the Cleveland Medical Gazette in November, 1895, p. 78.

whether sick headache can be cured by spectacles or not. In order to gain some information on this point I have decided to write to a few of my patients who might aid me in settling this question. If you will answer the following questions and return promptly in the enclosed stamped envelope, I will greatly appreciate it:

"1. How frequently did you have attacks of sick headache before you were fitted with glasses?

"2. How frequently have you had such attacks since you were fitted with glasses?

"3. Do you have a return of sick headache if you leave off the glasses?"

The letter was sent to one hundred patients in whom I had made a diagnosis of migraine. This included all the patients who consulted me during 1902 and 1904 who were suffering from sick headache. I selected these cases primarily because only since 1902 have my records been kept in such a manner as to be readily accessible, and, secondly, because I thought two years would be long enough to determine the results of treatment.

It seems as though the first question as to the frequency of attacks would be easy to answer, and yet most of them gave indefinite answers, such as "frequently" or "very frequently." Generally speaking, however, attacks of once a month or more than once a month were tabulated as "frequently" and more than once a week as "very frequently."

I am aware that much has been written as to the difficulty of making a diagnosis of migraine, but I have had no hesitation in making such a diagnosis in all cases in which there has been periodical transient attacks of scintillating scotoma, flashes of light or hemianopsia, followed by intense headache, nausea, and vomiting. In some cases the attacks are relatively mild, lasting from four to five hours, while others are so severe as to totally incapacitate the patient for two or three days.

The statement of authors that migraine always disappears at the age of 40 or 50 has not been in accordance with my experience. In the case of ordinary laborers, housewives and mechanics, it is true that the attacks ordinarily cease about this age. They have learned the truth of the old adage that a person is "either a fool or a doctor at 40." With advancing presbyopia they accept spectacles, choose another occupation or give up the use of the eyes and are thus relieved of eye-strain. But many professional people continue to use their eyes and consequently continue to have sick headaches and, indeed, more often find it greatly increased with the coming on of presbyopia.

There is another observation I wish to make in passing, which seems to have been entirely overlooked in the discussion of this subject, namely, it is possible for a person with emmetropic eyes to have migraine from eye-strain; consequently, a correction of an error of refraction may not entirely cure a patient of migraine if said patient thus continues to overwork. It must have been the experience of all of you to meet patients who have been entirely relieved of their attacks of sick headache for a number of years, and then have these same people return complaining of the old enemy and wishing a change of lenses. A careful examination shows no change of refraction. However, on inquiry the patient's habits reveal that he is doing three or four times the amount of eye work he ought to do. The only cure is less work and more play.

If you will pardon a personal reference will say that in my own case I do not have an attack once a year, yet I could bring one on within a week if I did all the reading I should like to do. I have learned my limitations—it is a case of becoming a doctor instead of a fool at 40. One of my best friends has not learned this lesson at 70 and continues to rail at the oculists because they do not cure his migraine.⁵

According to the patients' testimony, 55 cases were cured, that is, had no return of the migraine after the error of refraction was corrected. Thirty-one cases were greatly benefited and seldom had attacks, and when they came could usually be accounted for by leaving off the spectacles, excessive eye work, worry, indiscretion in eating and drinking, commencing presbyopia, etc. Of the 14 cases that were not benefited by correction of the error of refraction, 5 were cured by tenotomy of the ocular muscles (Nos. 5, 29, 45, 64 and 89), 1 was cured by the use of the pessary (No. 38), while 8 cases continued to suffer more or less severely from migraine, but all of them continued to wear glasses and said they could not do without them.

One case had iritis of both eyes (No. 18), probably specific, and should not have been included in this report. Another case (No. 72), in which several tenotomies were made, was a hysterical girl and was apparently worse than before. Still another case (No. 32) has a dilated stomach and has been greatly improved by lavage. Another case (No. 100) has had facial neuralgia, for which operation has been made from which she received some benefit.

See article in the Transactions of the Ohio State Medical Association, 1904, on Migraine, by Dr. D. N. Kinsman.

Eighty-nine patients answered "Yes" to the third question—that there would be a return of the headache if glasses were left off, 5 patients have discarded the spectacles for distance and only wear them for near work. All the others continue to wear them for near and distant vision.

The refraction of these cases as indicated by the lenses prescribed is very suggestive as to the cause of migraine. In all cases the examination was made under a mydriatic, and in every one where relief was not obtained they were re-examined under a prolonged use of atropia. In nearly every case the total amount of latent as well as manifest ametropia was corrected. About .25 D. less for hyperopia was prescribed than that accepted by the patient in reading the "test type" so as to correct for infinity, rather than for twenty feet.⁶

Tenotomy was only performed as a last resort after prolonged efforts to strengthen the muscles by prism exercises, etc., failed.

The refraction of the 200 eyes of the 100 patients, as indicated by the lenses prescribed, were:

| Hyperopia | 25 |
|--------------------------------|----|
| | |
| Simple hyperopic astigmatism 4 | 8 |
| Compound hyperopic astigmatism | 1 |
| Myopia | 4 |
| Simple myopic astigmatism 1 | |
| Compound myopic astigmatism | 4 |
| Mixed astigmatism 2 | 5 |
| _ | - |
| Total 20 | 00 |

A more significant observation is that of the 100 patients there was astigmatism corrected of one or both eyes in 85 cases and at oblique axis in one or both eyes in 42 cases. There was anisometropia of 1 or more \dot{D} . in 15 cases.

It is to be noted in the only case of simple myopia in both eyes in which the patients suffered from migraine (No. 93) the sick headache was not benefited by a correction of the error of refraction.

It seems to me that a careful analysis of the refraction of these cases will almost force the conclusion that the predominating factor in the etiology of migraine is astigmatism, especially if at an oblique axis. Anisometropia and heterophoria are also frequent etiologic factors.

Heredity has always been recognized as having an important bearing in causing migraine, but I never quite fully appreciated

^{6.} See paper by Dr. F. K. Smith, published in the Cleveland Medical Gazette, on the "Development of the Test Card," June, 1896.

RELIEF AND CURE OF MIGRAINE—TABLE OF CASES.

| | | | First ation. | | | 1 | | |
|-----|-------------------|------|------------------------------|-----------------------|------------------------------------|---|-----------------------------------|--|
| No. | Name. | Age. | Date of First Examination | Occupation. | Frequency of Attacks Before. | Correction. | Frequency of Attacks After. | Return of Headache Without Glasses. |
| 1 | Miss E. G | | - | Dressmaker | Frequently. | L+1.25 = +0.50 Ax. 90. | After over- | Vas. |
| 2 | | | | Bookkeeper | Frequently. | R + 1.25 = +0.50 Ax. 90. | work | Yes. |
| 3 | | | | | | $\begin{array}{l} R - 0.75 = +2.50 \text{ Ax. } 180. \\ L + 0.25 \text{ Ax. } 165. \end{array}$ | Onite often | Yes |
| 4 | | | | | | K + 0.50 Ax. 15. | Not so hard. | Yes. |
| 5 | Miss L. H | 17 | 1903 | teacher. Student | Once every | L + 2.00 = -4.00 Ax. 180 R + 2.00 = -3.00 Ax. 65 | As before | Relief after tenotomy |
| | | | | | | L + 0.12 Ax. 70 | f | by another ophthal- mologist. |
| 6 | | | | School teacher | quently. | L + 3.00 = +0.25 Ax. 90 R + 2.75 = +0.25 Ax. 90 | in 10 years. | glasses are left off. |
| 7 | Miss M. S | 28 | 1903 | School teacher | Very frequently. | 11 - 11 25 - 1 100 AT 90 | None | Voc |
| 8 | Miss F. C | 18 | 1889 | College stu- dent. | Frequently | $\begin{array}{c} R + 0.25 = +1.00 \text{ Ax.} & 50 \\ L + 2.00 = +0.75 \text{ Ax.} & 90 \\ R + 0.25 = +0.50 \text{ Ax.} & 165 \end{array}$ | Not often, can | Yes |
| 9 | Miss C. B | 46 | 1893 | Stenographer. | Once a week. | Li + 1, 60 = + 0,00 Ax, 180 | None | Yes. |
| 10 | Mise T A | 12 | 1001 | School girl | Twice a | R + 1.75 = +0.25 Ax. 180 Reading + 2.00 scale. L + 0.25 = +0.50 Ax. | Very seldom. | Yes. |
| 11 | | | | Physician's | week. | R + 0.25 = +0.50 Ax. 90 | | Yes. |
| | | | | wife. | | L + 0.50 Ax. 105 R + 0.50 Ax. 90 | None | |
| 12 | Mrs. A. 1 | 91 | 1892 | Minister's wife. | r requently | R+1.00 | None | Yes. |
| | | - | | | | Reading + 1 scale. Bifocal. | | |
| 13 | Miss N. Van O. | 20 | 1902 | College stu- dent. | day during | R + 1.00 = + 0.25 Ax. 15 | None | Yes. |
| 14 | Miss E. M | 17 | 1898 | High school student. | Very fre- quently. | L+1.25 Ax. 105 R-1.25 Ax. 75 | Occasionally | Yes. |
| 15 | Miss L. S | 17 | 1900 | High school student. | Frequently | L + 2.50 = +0.50 Ax. 90 | Occasionally | Yes. |
| 16 | Mrs. M.McL. | 35 | 1901 | Housewife | Once a week. | R + 2.50 = +0.75 Ax. 90 L + 1.50 = +1.00 Ax. 90 | None | Yes. |
| 17 | Miss N. H | 22 | 1903 | Nurse | Once ortwice | R+1.50=+1.00 Ax. 50 L-0.75=-1.50 Ax. 65 | Once in 3 or 4 | Yes. |
| 18 | Mrs. W. S | 27 | 1908 | Housewife | a week. Every four or | R - 2.00 = -0.25 Ax. 180 L - 1.00 = +4.50 Ax. 100 R + 1.75 = +1.50 Ax. 60 | months. About the | Has had iritis. |
| 19 | Miss F. B | 12 | 1894 | School girl | rive or six | 11 1.00 = + 3.00 Ax 90 | I to 2 venre he. | Yes. |
| 20 | Mrs. A. M | 35 | 1903 | Housewife | Every two | R-1.00=+3.00 Ax. 50 L+0.12 R+0.25 Ax. 80 | tw'n attacks- None | Yes, health improved. |
| | | | | | weeks. | | | does not need glasses continually. |
| 21 | Mrs. L. F | 42 | 1901 | Bookkeeper | Once a mo | R+1.75 R+1.75 Reading + 1 scale. | None, | Yes, health improved, glasses for close work. |
| 22 | Miss D. G | 21 | 1900 | College stu- | Frequently | Bifocal. L+0.75 | None | Yes. |
| 23 | | | | dent. Physician | Frequently | R + 0.75 | None | |
| 24 | | | | Music teacher. | | R 1 25 Av 180 | | Yes. since left college only for close work. Yes. |
| 25 | | | | | | L + 1.00 = + 0.75 Ax. 95 R + 1.25 = + 0.50 Ax. 85 L + 0.75 Ax. 90: | Francis 43 | |
| | | | | Housewife | Frequently. | | | Yes, can not do with- out glasses. |
| 55 | | | | Clergyman | Two or three times a wk. | R + 200 = + 200 Ax MD | None | Yes. |
| 27 | | | | College stu- dent. | OLCO & WOOK. | R = 0.50 = + 0.25 Ax. 90 | very soldom | Yes. |
| 28 | | | | Physician's wife. | Twice a wk | | vears. | Yes, when glasses were broken. |
| 29 | Mrs. H. H | 37 | 1903 | Author | Frequently, | R + 0.50 = + 1.50 Ax. 105 L + 0.29 Ax. 90 R + 0.12 Ax. 105 | None | Yes, exophoria. Relief only after tenotom y. We aring prisms fitted by ophthalmologist years |
| 250 | Mrs. T. U | 37 | 1903 | Housewife | Frequently | $L + 5.50 = +1.00 \mathrm{Ax}.135$ | Once in 6 mos. | ago. Yes. |
| 31 | Master R. B. | 12 | 1902 | School boy | Frequently | L + 5.50 = + 1.00 Ax. 135 R + 5.50 + + 0.50 Ax. 55 L + 0.25 = + 0.25 Ax. 125 R + 0.25 = + 0.25 Ax. 65 | None | Yes. |
| | | | | | when in school. | R + 0.25 = +0.25 Ax. 65 | | |

RELIEF AND CURE OF MIGRAINE—TABLE OF CASES—Continued.

| No. | Name. | Age. | Date of First. Examination | Occupation. | Frequency of Attacks Before. | Correction. | Frequency of Attacks After. | Return of Headache Without Glasses. |
|-----|------------|------|-------------------------------|------------------------------|------------------------------------|--|--------------------------------------|---|
| 32 | Mrs. W. S | 35 | 1902 | Clergyman's wife. | Every three weeks since childhood. | L + 0.75 = + 0.50 Ax. 90 R + 2.00 Ax. 90 | Not so frequently or severe. | Yes, ophthalmophegia migraine of the neu- rologist ptosis of right eye; cured. |
| 33 | Rev. C. D | 27 | 1901 | Clergyman | Once in two weeks. | L + 0.50 Ax. 90 R + 0.50 Ax. 90 | None | During päst few years can do without glasses for distance. |
| 34 | Miss A. P | 14 | 1904 | School girl | Once in 2 to | L + 1.00 = + 0.50 Ax. 90 | None | Yes. |
| 35 | Mrs. A | 37 | 1896 | Author | Once in six weeks. | $\begin{array}{l} L + 1.00 = + 0.50 \ Ax. \ 90 \\ R + 1.00 = + 0.50 \ Ax. \ 90 \\ L - 1.25 \ Ax. \ 75. \dots \\ R - 0.75 \ Ax. \ 90 \\ Reading + 1 \ scale. \\ Biforal. \end{array}$ | None | Yes. |
| 36 | DrR | 37 | 1899 | Physician | Two or three times a mo. | L + 0.75 R + 0.25 = +0.25 Ax. 180 Reading + 1 scale. Bifocal. | Seldom | Yes. |
| 37 | Rev. C. B | 23 | 1885 | Clergyman | One or two times a mo. | L - 0.50 = +1.00 Ax. 90 R - 0.50 = +0.75 Ax. 90 Reading + 1 scale. Bifocal | None | Yes, had return of sick headaches about 40; relieved with bi- focals. |
| 38 | Mrs. C. Z | 26 | 1899 | Clergyman's wife. | Frequently | L + 1.75 = +0.75 Ax. 80 R + 2.00 = +1.00 Ax. 105 | About same | Subsequently got re- lief by wearing pes- sary. Continues to wear glasses con- stantly. |
| 39 | Mr. H. H | 16 | 1900 | School boy | Frequently | L+1.00 Ax. 90 R+1.25 Ax. 90 | Seldom | Yes, sometimes has attacks after using eyes for close work. |
| 40 | Mr. W. H | 24 | 1897 | Architect | Two or three times a yr. | L - 0.75 = + 2.25 Ax. 90 R - 0.75 = + 2.00 Ax. 95 | About the same. | Relieved of constant headache; can not do without glasses. |
| 41 | Mr. C. S | 19 | 1891 | College stu- | Frequently | L + 1.25 Ax. 90 | Very seldom | Yes. |
| 42 | | | | | | $\begin{array}{l} L+1.25~\mathrm{Ax.}~90.\dots \\ R-0.25=+1.50~\mathrm{Ax.}~90 \\ L-1.00=-2.00~\mathrm{Ax.}~90 \\ R-1.00=-1.75~\mathrm{Ax.}~100 \\ \mathrm{Reading}+2.50~\mathrm{scale.} \\ \mathrm{Bifocal.} \end{array}$ | | Yes. |
| 43 | | | | | once a mo. | Bifocal. L + 1.25 = + 0.25 Ax. 105 R + 1.25 = + 1.25 Ax. 45 | | in 24 hours. |
| 44 | Mrs. J. Mc | 34 | 1903 | Housewife | Once ortwice | R - 0.75 = +1.50 Ax. 90 R - 0.75 = +1.25 Ax. 90 | Only once or twice in 3 years. | Yes. |
| 10 | Miss J. S | 33 | 1895 | Principal of grammar school. | Two times a month. | L + 0.75 Ax. 90 R + 1.00 Ax. 170 | None | Yes, hypophoria. No relief from m graine until tenotomy and advancement was made of rectus mus- |
| 46 | Mr. J. F | 33 | 1903 | Civil engineer. | Once in six | L+2.75 | None | cles. Yes. |
| 47 | | | | School teacher | WAALO | R + 2.75 L - 0.75 = -0.50 Ax. 180 R - 0.75 = -0.50 Ax. 180 | None | Yes. |
| 48 | | | | | Two to three | R - 0.75 = -0.50 Ax. 180 L + 0.12 | None | Yes. |
| 49 | Mrs E R | 20 | 1806 | Music teacher | times a yr. | L + 0.12 R + 0.50 Ax. 90 L + 1.00 | | Yes. Had return of |
| 40 | | | | | month. | $\begin{array}{l} L+1.00 \\ R+1.00 \\ \end{array}$ Reading + 3 scale. Bifocal. | | headache several years ago, but none since wearing bi- focals. |
| 50 | | | | | | R = 1.25 Reading + 0.12 Ax. 90 | None | Yes. |
| 51 | Miss G. P | 27 | 1895 | School teacher | One time a | L + 0.75 bifocal. L - 0.75 = + 1.25 Ax. 90 | None | Yes. |
| 52 | | | | Physician | month. Once a week. | R + 0.50 Ax. 90 | | Yes. In college had attack Friday morn- ing. Vacation, one in two weeks. |
| 53 | Mr. I. B | 35 | 1896 | Superintendent. | Three or four a month. | L + 0.50 Ax. 160 R + 0.75 Ax. 30 | None | Yes, since glasses fit- ted two or three at- tacks when left off. |

RELIEF AND CURE OF MIGRAINE—TABLE OF CASES —Continued.

| Name | | | _ | | | | | , |
|--|-----|---------------|------|------------------------------|-------------------------------|---------------------------|--|-------------------------|
| Miss M. P. 13 1903 High school of the week 1 4 5.00 -0.75 Ax. 180 None. Yes. | No. | Name. | Age. | Date of First Examination | Occupation. | of Attacks | Correction. Attacks Without Glass | |
| 55 Mrs. H. V. 29 1903 Physician. One time a K + 0.50 = -0.75 Ax. 180 None. Yes. 76 Mr. O. L. 35 1909 Principal of Princip | 54 | Mrs. E | 80 | 1903 | Physician's | Three or four | L + 0.87 Once in 6 mos. Yes. | |
| 15 | 55 | | | | | One time a | L + 0.87 L + 0.50 = -0.75 Ax. 180 None Yes. | |
| 20 | 56 | Miss M. P | 13 | 1904 | High school | week. One time a | R + 0.50 = -1.25 Ax. 180 L + 1.00 Ax. 90 Very seldom Yes. | |
| 20 | | Mr. O. I. | 33 | 1903 | student. | week. | R - 0.25 = +2.25 Ax. 90 | |
| 20 | 0, | Mica V C | 24 | 1001 | high school. | a month. | R + 2.50 T. + 1.50 - + 2.95 A = 125 None Veg one attack is | n fivo |
| 20 | 90 | MISS A. G | W. | 1501 | bookkeeper | weeks; of- ten one a | R+1.25=+2.25 Ax. 60 years when gl were broken. | asses |
| Mrs. J. A. 41 1903 Housewife Frequently. Frequently. Housewife Frequently. Housewife Frequently. Housewife Frequently. Housewife Frequently. Housewife Hou Ax. 90 None Yes, wearing min lenses. Refused Housewife Relief by bifocal: Housewife | 59 | Mr. J. McM | 20 | 1900 | Stenographer. | r requently | R + 0.50 = +0.25 - x. 90 Frequently, spectacles; can | n not |
| Mrs. J. A. 41 1903 Housewife Frequently. L + 1.55 R + 1.55 None Yes, has been wear minus oy i in denses for many y ves. | 60 | | | | | | Reading + 1 scale. mincing presby | opia. |
| in school; R + 0.25 = + 0.75 Ax. 90 class in vacation. | | | | | | | L+1.25 None | aring |
| Miss N. V. C. 30 1901 School teacher Frequently. L + 0.25 Ax. 6 0.25 Ax. 90. None. None. Yes, wearing min lenses. Refused a cc e pt hypero correction until ter tenotomy; elived entire relicence None. Yes. Ye | 62 | Master K | 15 | 1903 | School boy | in school; less in va- | R + 0.25 = +0.75 Ax. 90 | |
| Miss N. V. C. 23 1903 Stenographer. Twice a month. R + 1.25 = + 0.75 Ax. 105 Stenographer. Twice a month. R + 1.25 = + 0.75 Ax. 105 Stenographer. Stenographer. Twice a month. R + 1.25 = + 0.75 Ax. 105 Stenographer. Stenographer. Twice a month. R + 1.25 = + 0.75 Ax. 105 Stenographer. Stenographer. Stenographer. Twice a month. R + 1.25 = + 0.75 Ax. 105 Stenographer. Stenographer. Twice a month. Stenographer. Twice a month. | 63 | Miss L. V | 30 | 1901 | School teacher | Frequently | L + 0.50 Ax. 90 Occasionally | |
| The continue of the continue | 64 | Miss N. V. C. | 23 | 1903 | Stenographer. | Twice a | L + 0.75 Ax. 90 None Yes, wearing n lenses. Refuse accept hype | ed to |
| Comparison of the content of the c | 65 | Mrs. H. M. | 30 | 1903 | School teacher | One in two or | ter tenotomy | ; re- |
| Color Colo | 66 | | | | | | | |
| Color Colo | 67 | Mics M L | 27 | 1903 | teacher. | One a month | R + 2.00 = -3.25 Ax. 65 None | |
| R + 1.25 | 68 | Mrs W I. | 30 | 1807 | Honsowife | One a month | R + 1.75 | hond |
| R - 1.00 Ax. 90 R - 1.00 Ax. 90 Tacks, but in his person must be off glasses, so hoccasional attack in 3 y wears. One a month. Student. | 00 | | | | | | R+1.25 Reading + 1 scale. Rifogal aches when so girl; returned about 35 | when |
| R - 1.00 Ax. 90 R - 1.00 Ax. 90 Tacks, but in his begin fession must be off glasses, so hoccasional attack in 3 y when glasses brok attacht. Student. Stude | 69 | Miss M. K | 23 | 1903 | Music student. | One or two | L + 2.25 = +0.50 Ax. 90 Once or twice Yes. R + 2.25 = +0.25 Ax. 60 a year. | |
| 72 Miss M. J. 16 1903 School girl. Once in two L + 3.00 = +0.75 Ax. 90 None. Yes, 1 attack in 3 years. R + 3.00 = 2.75 Ax. 60 Twice a month. R + 0.25 Ax. 150 R + 0.25 Ax. 30 Twice a month. Severise. Yes, obliged to give exercise. The severise of sick headaches are significant. 74 Dr. A. B. 37 1895 Physician. One a month. R + 0.50 = -1.00 Ax. 180 Reading + 1 scale. Bifocal. Two a month. Two | 70 | Mr. W. K | 27 | 1899 | Actor | Frequently. | tacks, but in his fession must loff glasses, so | leave has |
| 73 Miss M. H 15 1903 High school student. 74 Dr. A. B 37 1895 Physician One a month. 75 Master J. B 5 1902 School boy One or two a month. 76 Mrs. E. E 31 1894 Superintendent of Y. W. C. A. 77 Rev. R. C 28 1803 Clergyman One time a week. Retouching photograp'r. 78 Mrs. F. C 23 1904 Retouching photograp'r. | 71 | Miss M. J | 16 | 1903 | School girl | Once in two | I. 1 3 00 - 1 0 75 Av 90 None Ves 1 attack in 3 | yrs. |
| 74 Dr. A. B | 72 | Miss A. H | 15 | 1896 | High school student. | One a month. | R + 3.00 = 2.75 Ax. 60 L + 0.25 Ax. 150 Twice a month. Wale several triangle $R + 0.25 Ax. 30$ | noto- |
| 75 Master J. B. 81 1895 Physician One a month L + 0.75 = -1.50 Ax. 180 None Yes, migraine sin childhood until le college. Return at 30. 76 Mrs. E. E. 31 1894 Superintendent of Y. W. C. A. Two a month Two a mon | 73 | Miss M. H | 15 | 1903 | High school student. | Once a week. | L + 0.25 = +0.25 Ax. 60 Occasionally Yes, obliged to give $R + 0.25 = +0.25 Ax$. 60 School. No re | ve up |
| 76 Master J. B 8 1902 School boy One or two L + 0.50 = + 0.50 Ax. 90 Mrs. E. E 31 1894 Superintendent of Y. W. C.A. Two a month. Two a mon | | | | | | | $\begin{array}{llllllllllllllllllllllllllllllllllll$ | since l left rned |
| 77 Rev. R. C 28 1903 Clergyman One time a L -0.25 Ax. 180 | 75 | Master J. B | 8 | 1902 | School boy | One or two | L + 0.50 = + 0.50 Ax. 90 None Yes, several att | acks |
| 77 Rev. R. C 28 1903 Clergyman One time a L -0.25 Ax. 180 | 76 | Mrs. E. E | 31 | 1894 | Superintendent of Y. W. C. A. | Two a month. | $\begin{array}{llllllllllllllllllllllllllllllllllll$ | toff. |
| If \mathbf{mrs} , \mathbf{F} , \mathbf{C} , \mathbf{r} , \mathbf{C} and \mathbf{r} \mathbf | | | | | | | | |
| photograp'r. $R + 0.75 Ax. 90$ lenses. | 78 | Mrs. F. C | 23 | 1904 | Retouching | week. Frequently | R + 0.50 = +0.25 Ax. 95 Rarely Yes, wearing m | inus |
| 1 | 79 | Mr. A. D | 22 | 1895 | Farmer | Once in two months. | $\begin{array}{llllllllllllllllllllllllllllllllllll$ | |

RELIEF AND CURE OF MIGRAINE—TABLE OF CASES—Continued.

| No. | Name. | Age. | Date of First Examination | Occupation. | Frequency of Attacks Before. | Correction. | Frequency of Attacks After. | Return of Headache Without Glasses. |
|-----|---------------|------|------------------------------|----------------------------------|------------------------------------|---|-------------------------------------|---|
| 80 | | 27 | 1884 | high school. | | L + 0.75 Ax. 90 | | Medical Record, '87. Numerous relatives |
| 81 | Miss N. D | 28 | 1900 | School teacher | Every two | Bifocal. L + 2.75 R + 3.00 = + 0.75 Ax. 75 | Once or twice | suffer f'm migraine. Yes. |
| 82 | M 188 | 00 | 1903 | School teacher | Every Satur- | Li + 0.10 | None | 1es. |
| 83 | , | | | manufactur- ing com- pany. | times a month. | | months. | Yes, operated for stra- bismus when a child, wore +2 until 4 or 5 yrs. ago when first had attacks of mi- graine. |
| 84 | Miss D. | 14 | 1904 | School girl | times a mo. | | None | Yes. |
| 85 | Dr. J. F | 42 | 1904 | Physician | dur. school. One a month. | L+1.75 Ax. 95 R+1.75 Ax. 83 L+0.75 =+1.25 Ax. 90 | None | Yes. |
| 86 | Sister H | 34 | 1904 | Teacher | Two or three | L + 0.75 = +1.25 Ax. 90 | None | Yes. |
| 87 | Mr. J. H | 32 | 1901 | Attorney | Two or three | R + 1.00 = + 1.00 Ax. 90 L + 0.75 = -1.50 Ax. 180 | Two or three | Yes. |
| 88 | Dr. W. J | 30 | 1890 | Dentist | Twice a mo. | R + 0.75 = -1.00 Ax. 180 L + 3.25 = +1.00 Ax. 90 R + 2.00 = +1.50 Ax. 90 | Once in six | Yes. |
| 89 | Mr. T. B | 34 | 1894 | Bookkeeper | Unce in two | L — 0.75 Ax. 180 R — 1.00 Ax. 150 | None | res, tenotomy of su- |
| 90 | Sister A | 35 | 1902 | Teacher | Every two | L + 2.00 = +0.25 Ax. 90 R + 2.00 = +0.25 Ax. 90 | None | perior rectus. Yes. |
| 91 | Mrs. F. B | 20 | 1887 | College stu- | Frequently | L - 3.00 = -3.00 Ax. 150 R - 3.00 = -2.00 Ax. 30 | None | Yes. |
| 92 | Miss K. G | 21 | 1900 | College stu- | Frequently | L + 0.70 Ax. 90 R + 1.00 Ax. 90 | None | Yes. |
| 93 | Mr. R. H. C. | 17 | 1903 | College stu- dent. | Once a week. | L - 2.00 | Once in three months. | Thinks leaving off glasses would make no difference. |
| 94 | Miss P. M | 16 | 1903 | High school | Once a week. | L + 1.00 = 0.25 Ax 90 R + 1.00 = 0.25 Ax 90 | None | Yes. |
| 95 | Sister | 36 | 1897 | Superior of | Once a mo | $\begin{array}{l} R+1.00=0.25~Ax.~90\\ L+2.00\\ R+1.00=+1.50~Ax.~90\\ Reading+1~scale.\\ L-0.25=+1.50~Ax.~90 \end{array}$ | Once or twice a year. | Does not wear correction for distance. |
| 96 | Mr. U. B. K. | 20 | 1900 | Theological student. | Once a mo | L - 0.25 = +1.50 Ax. 90 R - 0.50 = +2.00 Ax. 90 | None | Yes, |
| 97 | Miss L. J | 39 | 1899 | Stenographer. | Frequently. | L + 0.50 = + 0.25 Ax. 90 R + 0.50 = + 0.25 Ax. 90 R + 0.50 = + 0.25 Ax. 90 + 1 scale. Bifocal. | Two or three times a year. | Yes. |
| 98 | Mrs. J. B. M. | 37 | 1895 | Insurance so- licitor. | Frequently. | L + 0.25 Ax. 120 R + 0.50 Ax. 45 + 1.75 scale. Bifocal. | 1 | Yes, migraine ret'ned cured by bifocals. |
| 99 | Sister H | 30 | 1902 | Teacher | Frequently. | L + 0.75 Ax. 90 | About half as frequently as before. | Yes. |
| 100 | Mrs. J. W | 30 | 1890 | Housewife | Once in three months. | $L + 1.00 = +2.00 \mathrm{Ax}.180$ $R - 2.75$ | About the same. | |

how much it was a family disease until I began tabulating these cases. I was able to trace seventeen cases in one family, two of which are included in this report. I think in my own family tree I could trace even a larger number. An individual with a family predisposition, an astigmatic eye and an occupation or profession requiring much close use of the eyes will very frequently suffer from sick headache.

Although no such case appears in the table submitted, I know several people with essentially emetropic eyes and almost perfect muscle balance who suffer from migraine, but in every such case there is a strong family predisposition and the patients all use the eyes excessively or it may be in some unusual manner. I have apparently cured several cases in semi-invalids by prohibiting all reading and use of the eyes for close work in a recumbent position.

That there are other causes of migraine than eye-strain no one can doubt, but that they are exceptional I firmly believe, and in conclusion can only urge that we oculists reiterate the fact that the most frequent and usual cause of migraine is eye-strain until the general practitioner comes to recognize the truth of our position.

EYE-STRAIN AND CRIME.

G. M. CASE, M.D.

ELMIRA, N. Y.

The particular importance attached to eye-strain, in the etiology of many obscure nervous phenomena classed under "Functional Neuroses," is recognized to-day and acknowledged by most members of the medical profession. If an uncorrected refractive error will disturb the equilibrium of the nerve centers, after mature development has taken place, it must follow that, should a like condition exist in the developing child, the nerve centers would be disturbed and perversion of intellectual, moral and physical forces would be probable. Dr. Van Fleet, in a paper read before the New York Academy of Medicine in 1894 on "Defective Vision in its Relation to Crime," says: "At birth the human being is simply a creation of physical development; intellectual development comes later. The child of the most refined parents can be made a criminal, and, conversely, the child of the most depraved parents can be developed into the highest type of human being."

Education, therefore, begins in infancy through our mental appreciation of objects around us, the existence of which is demon-

strated to us through the medium of the eye and ear, the other senses being subordinate. It must follow, therefore, that the career of every man is made, in part, by his environment, his opportunities and powers and also by his physical equipment for life's work.

Crime and criminal tendencies in the young have been studied by men of vast ability and experience, and all phases of the subject have been investigated. Several years ago Professor Henderson, of Chicago, wrote: "All penalogical studies are drawing us back to educational measures. Penalties have little influence upon minds not disciplined to foresight of consequences and incapable of connected reasoning." Mr. Upham, Director of the School of Letters at the New York State Reformatory, located in Elmira, says: "This is the attitude of modern social science as set forth by a trained social worker, but we must confess that it is still a position far in advance of practical acceptance by society. The natural tendency of society to retaliation and penalty for crime is still strong. Education is not our first impulse toward the criminal. Considering all facts, we must agree with Professor Henderson's views that punishment merely as retaliation and not as education is wrong; first because it utterly fails in a vast majority of cases to make the man better; second, because society or the parent is to blame for the young man's act; society because it allows conditions to exist which can produce nothing but criminals, the parent because of the moral, educational and physical training he has failed to give his son. Education, then, is the keynote of modern corrective and reformatory treatment." Mr. Z. R. Brockway recognized this. In 1876 he came to Elmira as Superintendent of the New York State Reformatory and began the work of developing and extending the educational treatment of criminals in this institution. The results speak for themselves, as fully 80 per cent. of the men paroled or discharged from the Reformatory make useful law-abiding citizens.

As a premise of what is to follow, I make a quotation from the thirtieth annual report of the New York State Reformatory at Elmira, which says: "Penal institutions, especially juvenile and intermediate reformatories, are composed of young men who as a class disclose themselves to be in their natures fundamentally about like the young men wherever found. They respond to the same influences in about the same way. In former years statistics were published as to the 'moral sense' and 'susceptibility to moral impressions.' These were based upon observations at the time of admission, when the prisoner is at a decided disadvantage, and we have come to the conclusion that they did injustice and were not of suffi-

cient value to justify their continuance." As a writer in the Atlantic Monthly recently remarked: "It is true that there are peculiar specimens of humanity in prisons; cranks, freaks, degenerates and hardened and vicious characters, but so are all these to be found outside the prisons, mixed in with the other people of the world in the different grades of society." I wish also to quote from the New York State Reformatory Discipline the following: "The courts have sentenced these men to imprisonment to remove them from society for the time being, to the welfare of which their acts have shown them to be a menace. The reformatory rather than the state prison has been selected as the place of imprisonment on the theory that there is possibly enough good in them to justify the hope that they can be changed so as to cease to be a burden on the public by becoming law-abiding and self-supporting citizens.

"Bringing about such a change is our commission.

"Punishment for some particular crime they all receive, in that such crime leads to the restraint of their liberties while they are in the institution. This, however, is but an incident.

"We are not asked to consider the past, but only the future. The commitment papers give us no information as to the circumstances of their misdeeds and no suggestions as to how long they should be confined. We are by statute expressly permitted, in our discretion, to 'allow any prisoner to go upon parole outside the reformatory buildings and enclosure' and to give 'an absolute release or discharge from imprisonment' when it appears 'that there is a strong reasonable probability that any prisoner will remain at liberty without violating the law.' Conversely, with certain limitations hereafter noted, we are expected to keep them until they are educated, trained and reformed so as to stand this test.

"The institution, therefore, primarily is a great school.

"We have already stated that we do not find anything mysterious or distinctive about the ordinary criminal. He is thoroughly commonplace, so the education and training he requires does not differ materially from that which would be good for the ordinary man.

"We have discovered no alchemy for turning base metals into gold nor any different methods for making good citizens than those which prevail in the best public and private schools for free men.

"Mr. Joseph F. Scott, before the National Prison Congress last year, thus, in a few words, summed up the principle under which he works: "The best method for the reformation of criminals is to subject them to a system of discipline and training which is found essential to the training of the normal youth to correct moral and social living."

"We try to develop what good natural qualities, physical, mental and moral, they may possess, and add new ones, and to make them masters of themselves so they may keep evil impulses in check.

"The particular crime for which he was sentenced, considered by itself, throws little light on the question what treatment a prisoner needs. It seldom happens that a man goes wrong suddenly. Usually there is something radically wrong about him long before he becomes technically a criminal. The crime of burglary, grand larceny or forgery, as the case may be, followed naturally enough from what had gone before. We, therefore, prior to assigning him his work in the institution, find out all we can about his ancestry, environment, associations, education, habits of life, attainments, and physical and mental condition.

"These usually show very plainly why he became a criminal and suggest how the cure must come, if cure be possible."

By a careful investigation of statistics we learn that of prisoners in "intermediate reformatories" 83 per cent. of them are of good mental capacity. More than 60 per cent. of them had no education beyond the ability to read and write, and, of these 4½ per cent. are illiterates, without any education at all. More than 70 per cent. were servants, clerks, common laborers, without any industrial training, or at least to possess the rudiments of a trade. These facts are very instructive and are worthy of thoughtful consideration. Many causes have led to this condition of the individual, among which may be enumerated lack of proper parental control in early life, environment, associations, etc., and, another, impairment of the two principal human senses, hearing and seeing, especially the latter.

It is not within the scope of this paper to study the environment, opportunities and moral powers of the individual, but his physical equipment, especially from an ophthalmological standpoint. It can not be gainsaid but that impairment of vision is a most serious handicap in all walks of life, more especially in the young who have to gain about all of their useful knowledge of this world by this one sense alone.

The results of defective eyes may be varied. "Some may be content to accept the fact as it is. They would be designated stupid. Some, by persistent exercise of the organ, may develop their accommodative powers sufficiently to overcome the trouble, but it will be at the expense of some other portion of the machine. Some, battling against these odds, may not be so happily constituted as to be able to exert the force and fail. The first accepts defeat and says no more about it. The second achieves success at the expense of

general health. The third, which will constitute a large proportion of the people so affected, will writhe under defeat. They will be the disappointed people. Unwilling to accept places in the lower walks of life, they try to compete with their more favored brothers. But they are handicapped and, failing in the race, because of the unequal struggle, they seek to gain by foul means what they ought to get by fair. And so, from childhood up, the world to them is never quite right. They are taught to think white when they see black. What they are told is straight, to them, seems crooked. How can an individual so weighted be expected to be like other men. To him things are never as they seem. He thinks the whole world is wrong. He becomes a criminal from necessity."

The organ of vision in the development of civilization is strikingly apparent to every one. I quote one paragraph from an exhaustive article on this subject by Dr. Geo. M. Gould, of Philadelphia, which alone furnishes a subject for serious consideration. He says: "Not only is man's physical existence dependent upon seeing, but his intellect and all resultant civilization is literally a product of vision." The individual, therefore, who begins life with poor vision, whatever the cause, or be his environment or heredity what it may, has a struggle before him to meet the exigencies of life.

As to its effects in the production of crime and criminals little has been written.

A study of criminology leads us to a study of the individual, especially the early life. He comes into the world with a neurotic, if not an unstable cerebral mechanism, his surroundings, as a rule, only encourage these heredity tendencies and it is not unreasonable to assume that even "slight stresses or strains of life may switch him off the track into lines of inebriety, licentiousness and other habits which so often are the precursion of crime."

It is a matter of daily observation that eye-strain will disturb the mental processes, producing mental inaptitude and backwardness in children. Their comprehension seems obtuse and slow and confusion of thought exists. Irritability, even to the verge of irascibility, may be the result of a constant nagging eye-strain kept up hour after hour, for days and months, producing serious inroads upon the nerve supply. How far this may be carried towards producing mental unbalances, insanities and criminal tendencies, alcoholic and drug habits remains to be proven. I think, however, there is no room for doubting the fact that truancy in school children, in a large percentage of cases, can be traced to this cause, and which, when frequently repeated, "precipitate the individual into the life

of a vagabond and criminal." Instances are common. This picture I do not think is overdrawn. It is of daily occurrence, not only in the classes that go to make up our criminals, but in every grade of society. The number probably never will be known of those who have led lives of miserable existence, if not made physical wrecks and many times moral wrecks also, from the expenditure or leakage of nerve force, in an attempt to correct a refractive error.

Through the painstaking care of Dr. F. L. Christian, senior physician to the New York State Reformatory, I am enabled to give the results of an examination of five thousand inmates on entering the institution.

Condition on admission to the New York State Reformatory at Elmira of 5,000 inmates received between 1900 and 1906:

| Average age 20% year | rs. |
|-----------------------------------|-----------|
| Number, | Per Cent. |
| Addicted to use of alcohol | 54 7/10 |
| Suffering from syphilis | 3 1/4 |
| Suffering from tuberculosis | 16 1/2 |
| Suffering from defective eyesight | 13 1/2 |
| Suffering from defective hearing | 5 5/8 |

This seems to be an unusually large number, at this age, to be addicted to the alcoholic habit. A nervous system "constantly harassed by evil effects of eye-strain needs to be quieted or numbed from this constant irritation," and it is apparent that the connection between the two, drug or alcohol habit and eye-strain, is more than merely accidental, not only among the class that go to make up the criminal, but in all walks of life. In examining the figures in this table you will observe that 13½ per cent. showed defective eyes and 5½ per cent. defective ears on admission, or in all about one-fifth were seriously handicapped by impairment of these two senses. These data were taken by the reformatory physicians for record, those with defective eyes or ears being at once referred to the oculist.

During fifteen years of service as oculist to the New York State Reformatory, located in Elmira, I have examined the eyes of several thousand inmates. These having been referred to me by the superintendent of the reformatory or the reformatory physician for defective vision, or in some cases the prisoner was lacking in deportment or failed to make satisfactory progress in school of letters or trades school; defective eyes were thought to be the possible cause. The main object, therefore, was to relieve a disability. The work has been conscientiously done, and, although far from the ideal, the results have been satisfactory, as is shown in the school work and demeanor. During my entire service I have had the hearty coöperation of the superintendents and physicians in charge. The kind of ophthalmic treatment the prisoners received seemed to be entirely

satisfactory to all concerned. The general feeling, however, has been that had more painstaking care been exercised, as is done in our large ophthalmic hospitals or private practice, the results would have been proportionately better. But the time has never been quite ripe when such procedure could be carried out, mainly because of lack of adequate funds, no state appropriation being made—useless expense, as some officials state it. Importance of work does not appeal to them. Possibly it would not be straining a point to suggest that if more work was done along these lines less money would be needed in building and maintaining prisons. Detecting the ocular defects which exist in prisoners is attended with very many of the difficulties which are found in examining the eyes of school children. The present methods are such that the large number of examinations that have to be made, and the rapidity with which the oculist is compelled to complete them, materially interferes with satisfactory work. He has to overlook a considerable number of eve defects which he suspects but can not investigate; for instance, to discriminate between low grade myopia and astigmatism, whether there exists a small amount of plus or minus astigmatism, or even higher grades of astigmatism at irregular angles. It has been my custom to examine about twenty-five men in an evening. Not all of these were refractive cases. Many were malingerers. Dissatisfaction with their trade is one of the common complaints among reformatory inmates, bad eyes being one of the main excuses for wanting trade changed. Malingering is a common practice, but is usually eliminated by very simple means, many times by suggestion alone; but in occasional cases ophthalmoscope, ophthalmometer and skiascope have to be utilized for its detection. A good ophthalmometer is a great saver of time to the oculist in prison work.

Very high degrees of astigmatism are more common than usually found among ordinary patients. The same is true of myopia and hyperopia. The work in the New York State Reformatory at Elmira, perhaps, has not been done any more thoroughly than in many other institutions. We have, however, carefully kept records of each case examined, and we have been enabled to observe the results after ocular treatment and to approximately give conditions as we found them. I might say records were not kept with the expectation of publishing results, but for reference only. So I apologize for what is lacking.

I fully appreciate that this report loses much of its scientific value for three reasons: First, a cyclopegic was not used in all the cases; second, muscular imbalances ignored unless of such a high degree as to cause diplopia; third, an anisometropia where one eye

showed normal vision, with no correction, error in the other eye not corrected even when normal vision could be attained thereby. A large number referred to as hyperopic and myopic should justly be classed under the heading of compound astigmatism, but as it was extremely difficult if not impossible under conditions examined to determine the amount and axis of the astigmatism in many of the cases, all things considered, it was thought best to only correct the error requiring spherical lenses where 20/30 or 20/20 vision could be obtained by such corrections. In other words, I endeavored to correct manifest errors. It was noticeable that of the large number of glasses prescribed for myopia, hypermetropia and astigmatism, the few prisoners who made complaint that the glasses were not suited to their eyes. Apparently they seemed grateful for the partial relief the glasses afforded them, although their error was only comparatively and many times imperfectly corrected.

The 400 cases herewith reported were not selected, but taken as they were referred to the ophthalmologist; in 3,600 other cases I have examined it is believed that the errors of refraction would be in the same proportion as in the 400 cases.

Out of four hundred inmates examined, $36\frac{1}{2}$ per cent., 143 had error sufficient to receive glasses. The $62\frac{1}{2}$ per cent. remaining who did not receive glasses were not all malingerers, for many had an old trachoma, conjunctivitis, etc., and received the proper treatment, so that in all only $31\frac{1}{2}$ per cent. were found with no error or disease. Out of the total number examined, 148 showed some mental defectiveness, $9\frac{1}{2}$ per cent. of which number showed marked manifest refractive error.

Glasses were furnished more frequently to the American born than those of foreign parentage—26½ per cent. against 10½ per cent. A cycloplegic (homatropin) was used in 17½ per cent. of all cases examined. Habit and former custom of the institution reason was not used more frequently. I believe all cases at this age should be refracted with a cycloplegic. Element of time and general feeling which prevailed among officials that present work was satisfactory seemed to preclude its universal adoption. In other words, correction of gross errors was considered good enough for prisoners. I think the time is not far distant when every prisoner admitted to our juvenile and intermediate reformatories showing defective eyes will be carefully examined under a cycloplegic.

No apparent relation existed between the kind of crime committed and the ocular defect.

Our figures show that even with correction of manifest refractive errors better work was done in schools, trades and general average was excellent. For example, there was only $1\frac{1}{2}$ per cent of poor progress in trades against 28 per cent. of good. Also in school work there were $7\frac{1}{2}$ per cent. of poor against $16\frac{1}{2}$ per cent. of good. The most striking improvement was in general progress, viz.: $6\frac{3}{4}$ per cent. of good; almost equal to the progress of the young man with no ocular defect. It will be observed that the ratio of improvement in schools and trades after glasses had been worn was almost equal to those who had no refraction error.

When it was suggested to me that I give a report of work done in the New York State Reformatory, I wondered what was being done along this line in similar institutions. This led to the sending out of a letter of inquiry to 123 penal institutions, juvenile and intermediate reformatories and prisons in the United States and Canada with the following questions:

- 1. Is the vision taken of each eve on admission of the prisoner?
- 2. What per cent. show defect in one eye?
- 3. What per cent. show defect in both eyes?
- 4. Are glasses prescribed for those suffering from refractive error?
- 5. Has there been any noticeable improvement in the prisoner's demeanor, conduct or progress in school or work after wearing glasses for correction?
 - 6. Do you have an oculist regularly visit the institution?
- 7. Is there any state appropriation to pay for expert ophthalmic examinations?
 - 8. What is the average age of the inmates of the institution?
 - 9. What is the average population of the institution?

A very small per cent. not only answered the letters, but wrote me personal letters, expressing their belief, "pro and con," gained from experience, that defective eyes and crime are closely related. Replies from many others gave me the impression that they thought the subject was of too little importance to discuss or investigate. Others made no reply at all.

No answers were received from 63 institutions; these evidently did not make any ophthalmic examinations or else were too indifferent concerning the work to formulate an answer. Thirty-one and one-fourth per cent. of juvenile reformatories take the vision of inmates upon admission, 37 3/11 per cent. intermediate reformatories and prisons, 12 and 4/33 per cent., averaging about 20 per cent., showing a marked neglect in this direction, compared with record of Bertillon measurements, photographs, etc., so carefully taken. Taking as a basis for our statistics replies received from 60 institutions, representing a population of 37,500, at an average age of 22 years, we find that 18½ per cent. showed defective vision in both

eyes and 12½ per cent. in one eye, or in all 30 per cent. showed a lowered standard of vision—a most serious handicap to these men, more especially the younger class of criminals.

Averaged from the replies received from the question, "Do you have an oculist visit the institution?" we found that 62½ per cent. do not have an oculist and only 5 per cent. have an optician. It is certainly a safe statement to make that no more than 50 per cent. of reformatories or prisons pay any attention to the condition of the eyes of the inmates, and in most cases the methods of examination and supplying glasses are so ancient and meager that it amounts to but very little. It is no longer good practice to give the prisoner a basket of spectacles and tell him to try them on until he finds a pair he likes. This may seem absurd to you, ophthalmologists, but nevertheless this is the treatment in vogue in many and many a prison in the United States. Is it little wonder that the officials have little faith in the value of glasses as an aid in the treatment of criminals?

That some good work is being done among criminals in refraction can not be gainsaid, for where an oculist does regularly visit the institution refractive errors are corrected in 90 per cent. of cases in intermediate reformatories, 84 per cent. in juvenile and 80 per cent. in prisons. My statistics show that best ophthalmic work is done in intermediate reformatories, and here best results are obtained in conduct, progress, etc., after wearing glasses. Replies to question 5, "Has there been noticeable improvement in the prisoner's demeanor, conduct, progress, school or work?" show:

JUVENILE REFORMATORIES.

| Questions answered in the affirmative: | Number. | Per | Cent. |
|---|---------|-----|-------|
| Demeanor | . 3 | 18 | 3/4 |
| Conduct | | 18 | 3/4 |
| | | | |
| School | 7 | 43 | 3/4 |
| Work | 4 | 25 | |
| Question answered in negative | 1 | 6 | 1/4 |
| Question not answered | 8 | 50 | |
| 1 | | | |
| INTERMEDIATE REFORMATORIES. | | | |
| Question answered in the affirmative: | | | |
| Demeanor | 5 | 45 | 5/11 |
| Conduct | | 45 | 5/11 |
| | | | |
| School | | 54 | 6/11 |
| Work | | 45 | 5/11 |
| Question answered in negative | | 18 | 2/11 |
| Question not answered | 3 | 27 | 3/11 |
| PRISONS. | | | |
| | | | |
| Question answered in the affirmative: | | | |
| Demeanor | 12 | 36 | 4/11 |
| Conduct | 12 | 36 | 4/11 |
| School | 14 | 42 | 14/3 |
| Work | 15 | 45 | 5/11 |
| Question answered in the negative | 5 | 15 | 5/33 |
| Question not answered | | | 13/3 |
| Agreement men emplicated that the transfer of | | | |

| RECAPITULATION. | Number. | Per Cent. |
|---------------------------------------|---------|-----------|
| Question answered in the affirmative: | | |
| Demeanor | 20 | 33 1/3 |
| Conduct | 20 | 33 1/3 |
| School | 27 | 45 |
| Work | 24 | 40 |
| Answers in the negative | 8 | 13 1/3 |
| Question not answered | 24 | 40 |

Considering the age, it is evident that better eye work is necessary in our juvenile schools, as it is right here that better results will be obtained than among old offenders. Still only $37\frac{1}{2}$ per cent. of these have an oculist visit the institution. In my opinion, it is just as necessary that the young criminal should have his refractive error corrected as the best boy in our public schools. It is not likely a boy steals because his vision is imperfect, but rather if defective eyes be at all at fault the damage has been done to his nervous mechanism before any criminal instincts were developed.

Many reasons exist why so little attention is given to the defective eves of criminals confined in our institutions, one of which is that there are no state appropriations for such work. On the average only 16 per cent. have any appropriation at all, and in these institutions it is entirely inadequate for carrying on any kind of accurate refractive work. In most states this false economy is largely responsible for the lack of proper medical treatment. Not only do the officials decline to obtain the services of trained men, but they also refuse to allow funds to purchase the necessary instruments. The prison hospital is the last place to be equipped and the first place from which twentieth century miracles are expected. Proper refractive work can not be done unless each prisoner is studied individually and under proper surroundings. This means the expenditure of considerable money in these institutions, but the beneficial results will more than compensate for the outlay. It can not be expected that the prison doctor will be a trained oculist. More often he is a general practitioner with whom the prison work is a side issue. Few prisons have resident medical officers. At any rate their time is limited in the prisons and the work is hurriedly done. Every prisoner should have his vision taken on admission, and if found imperfect should be referred to the oculist as soon as possible for investigation in order to correct his error and relieve the evestrain. This starts the prisoner right and does away with much of his bad behavior. A nervous system harassed by a constant evestrain is ready to give way under the slightest provocation. Any of us can bear witness to this fact who have suffered from an uncorrected refractive error. Prisoners are not different in this respect than other members of the human family, and when constantly suffering from pain in the head and eyes and other nervous symptoms are in no mood to be trained, educated and disciplined.

Dr. Frank L. Christian, senior physician to the reformatory at Elmira, a most careful observer, extending over a period of years, says: "The general progress of the men after receiving glasses was greatly improved and far better results were obtained than previously." He also says: "The records show that improved vision was in nearly all cases followed by not only better work at school and trades, but also in demeanor." Dr. Christian is not alone in this view, as many physicians to reformatories where conscientious eye work is done observe the same results.

One oculist writes me in reply to the questions thus, viz.: "After being an oculist to an institution for years, it is my opinion that criminals have good sight. 'Eye-strain and its Relation to Crime' does not hold. There is nothing in it. If you will read the transactions of the Academy of Medicine for 1895, you will note that this has been thoroughly discussed and settled. My own personal observation leads me to think that criminals see better than other people. They have to see well to pick pockets, crack safes, etc." Yet that same doctor, in answer to question 5, says: "There have been good results, and I prescribe glasses to all who have a manifest refractive error and regularly visit institutions for that purpose."

The eye defects of prisoners and the inmates of eleemosynary institutions are woefully neglected. In only a few intermediate reformatories are efforts made toward a systematic examination and treatment. The 37,500 inmates of these institutions are not receiving a "square deal" from the state which confines most of them without their consent. Listlessness and indifference is the usual attitude of those in authority and more than a passing appeal is needed to stir them. It behooves every ophthalmologist and every physician as well to use their utmost efforts to secure the proper recognition of the evil effects resulting from eye-strain among the wards of the state.

OCULIST'S REPORT.

The contents consist of a tabulated statement of replies received in answer to letters written in an endeavor to ascertain with some accuracy the conditions existing in penal institutions throughout the United States and Canada in regard to the following nine questions:

- 1. Is the vision taken of each eye on admission of the prisoner?
- 2. What per cent. show defect in one eye?
- 3. What per cent. show defect in both eyes?

- 4. Are glasses prescribed for those suffering from refractive error?
- 5. Has there been noticeable improvement in the prisoner's demeanor, conduct or progress in school or work after wearing glasses for correction?
 - 6. Do you have an oculist regularly visit the institution?
- 7. Is there any state appropriation to pay for expert ophthalmic examinations?
 - 8. What is the average age of the inmates of the institution?
 - 9. What is the average population of the institution?

For convenience the institutions were divided into juvenile reformatories, intermediate reformatories and prisons.

From 123 letters written, 60 replies were received. Some of the letters written in reply answered all of the questions, while others only answered a few of the questions.

QUESTION I.—IS THE VISION TAKEN OF EACH EYE, ON ADMISSION OF THE PRISONER.

| JUVENILE REFORMATORIES. | | |
|--|----------------|-------------------------------------|
| Question answered in the affirmative | 31 12 | Cent. 1/4 1/2 |
| Question answered in the negative 9 | 56 | 1/4 |
| INTERMEDIATE REFORMATORIES. | | |
| Question answered in the affirmative | 27 72 | 3/11 8/11 |
| PRISONS. | | |
| Question answered in the affirmative. 4 Question answered in the negative. 28 Question not answered. 1 | 12 84 3 | $\frac{4/33}{28/33}$ $\frac{1}{33}$ |
| RECAPITULATION. | | |
| Question answered in the affirmative 12 Question answered in the negative 45 Question not answered 3 | 20 75 5 | |
| AMETROPIA, | | |
| Inmates with hyperopia | 68 27 37 | 132 |
| Inmates with myopia Inmates with compound myopic astigmia Inmates with myopic astigmia | 37 19 18 | |
| Inmates with mixed astigmia | 7 10 | 74 |
| | | 17 |
| Total with ametropia and strabismus Total of inmates with ametropia sufficient for correction | | 223 146 |
| Ametropia cases not requiring correction | | 77 |

| DEGREES OF AMETROPIA. Number | | C |
|--|------------|------------|
| available 1 | 45 | Cent. |
| Inmates with hypermetropia less than 2 D | 9 | |
| Inmates with hypermetropia over 4 D | 14 | |
| Total hypermetropia | 15 | 68 |
| Inmates with myopia over 2 D | 9 | |
| Inmates with myopia over 4 D | 13 | 37 |
| Total myopia | 63 | 01 |
| Inmates with astigmia more than 2 D | 35 | |
| Inmates with astigmia more than 4 D | 10 | 108 |
| Town astignation | | |
| Total inmates with ametropia | | 213 |
| Total number of inmates receiving glasses Note.—Among the high degrees of refractive errors already received. | andod w | 146 |
| the following: | rueu w | e maa |
| Hypermetropia above 6 D | | |
| Myopia from 8 to 10 D | | |
| | | |
| Defective: | | |
| Glasses furnished | 38 | |
| Glasses not furnished | 110 | 148 |
| Normal: | | 140 |
| Glasses furnished | 108 | |
| Glasses not furnished | 144 | 252 |
| NATIVITY. | Tlam | |
| United States: Number. Glasses not furnished | Per 183 | Cent. |
| Glasses furnished | 105 | |
| Foreign: | | 288 |
| Glasses not furnished | 71 | |
| Glasses furnished | 41 | 112 |
| AMETROPIC CASES REQUIRING GLASSES. | | 112 |
| Inmates with hyperopia, in one or both eyes, glasses furnished | 34 | |
| Inmates with compound hypermetropic astigmia, glasses furnished | 22 | |
| Inmates with simple hypermetropic astigmia, glasses furnished | | |
| Total number of inmates where hypermetropia was predominar glasses furnished | | 84 |
| Inmates with myopia, in one or both eyes, glasses furnished | 26 | |
| Inmates with compound myopic astigmatism, glasses furnished Inmates with simple myopic astigmatism, glasses furnished | | |
| Total number of inmates where myopia was predominant, glass | | |
| furnished | | 48 |
| Inmates with mixed astigmatism, glasses furnished Inmates with convergent strabismus, glasses furnished | | |
| Inmates with divergent strabismus, glasses furnished | 2 | |
| Total number of inmates where strabismus was predominant, glass furnished | | 14 |
| Total number of inmates with ametropia and strabismus, sufficie | nt | |
| to require correction | | 146 |
| tion in each eye) whether glasses were furnished or not | | 89 |
| CONDUCT. | | |
| PROGRESS IN TRADE CLASSES. | | |
| Glasses furnished: Numbe | | Cent. |
| Poor 6 Fair 28 | | 1 1/2 7 |
| Good 112 | 2 | |
| Glasses not furnished: Poor | | 21/2 |
| Fair 41 | | 01/4 |
| | | |
| Good 203 | | 0 % |

| PROGRESS IN SCHOOL OF LETTERS. | | |
|---|---|--|
| Glasses furnished: | Number. | Per Cent. |
| Poor | | 7 % |
| Fair Good | | 121/2 |
| Glasses not furnished: | 152 | 161/2 |
| Poor | 53 | 141/2 |
| Fair | | 171/2 |
| Good | 132 | 3 |
| PROGRESS AND DEMEANOR. | | |
| Glasses furnished: | Number. | Per Cent. |
| Poor | | 7 |
| Fair Good | | 8 1/2 21 |
| Glasses not furnished: | | |
| Poor | | 171/4 |
| Fair | | 141/2 |
| Good | 127 | 31 % |
| GENERAL PROGRESS. | | |
| Glasses furnished: | Number. | |
| Poor Fair | | 61/2 |
| Good | | |
| Glasses not furnished: | | 20 /2 |
| Poor | | 18 |
| Fair Good | 60 | 15 |
| Good | 122 | 301/2 |
| QUESTION II.—WHAT PER CENT. SHOW DEFECT | IN ONE | EYE? |
| TITUTALITY DETIONAL MONTHS | | |
| | Number. | Per Cent. |
| Question not answered | 12 4 | 75 25 |
| Average | 4 | 8 3/5 |
| | | 0 0,0 |
| INTERMEDIATE REFORMATORIES. | | |
| Question not enguesed | 0 | E0 044 |
| Question not answered | 8 | 72 8/11 |
| Question answered (9.75, 90, 1 per cent.) | 8 | 27 3/11 |
| Question not answered (9.75, 90, 1 per cent.) Average showing defect in one eye | | |
| Question answered (9.75, 90, 1 per cent.) | | 27 3/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye | Number. | 27 3/11 33 29/50 Per Cent, 81 9/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered | Number. | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye | Number. | 27 3/11 33 29/50 Per Cent, 81 9/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered | Number. | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 113/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. | Number. 27 6 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered Question answered (20, 5, 2, 2, 113/47, 7 per cent.) Average showing defect in one eye RECAPITULATION. Question not answered. | Number. | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 113/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered. Per cent. showing defect in one eye, as averaged | 3 Number. 27 6 | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 113/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered. | 3 Number. 27 6 | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 113/47, 7 per cent.). Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. | 3 Number, 27 6 47 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 113/47, 7 per cent.). Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT | 3 Number, 27 6 47 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 113/47, 7 per cent.). Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. | Number. 27 6 47 13 IN BOTH | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered | Number. 27 6 47 13 IN BOTH | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered Question not answered (8, 10, 15, 15 per cent.) | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes INTERMEDIATE REFORMATORIES. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered. Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 12 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes Question not answered (36½, 60, 3 per cent.) | 3 Number, 27 6 47 13 IN BOTH Number, 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 12 72 8/11 27 3/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered. Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 12 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. Question not answered . PRISONS. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 12 72 8/11 27 3/11 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60, 3 per cent.) Average showing defect in both eyes. PRISONS. Question not answered. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 26 12 72 8/11 27 3/11 33 1/6 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered. Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered Question answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60. 3 per cent.) Average showing defect in both eyes. Question not answered (36½, 60. 3 per cent.) Average showing defect in both eyes. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 12 72 8/11 27 3/11 33 1/6 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60, 3 per cent.) Average showing defect in both eyes. PRISONS. Question not answered. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 26 12 72 8/11 27 3/11 33 1/6 |
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| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. PRISONS. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question answered. Question answered. Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60, 3 per cent.) Average showing defect in both eyes. PRISONS. Question not answered. Question not answered. Question not answered. Question not answered (10, 5, 10, 6, 20, 24/47, 14 1/10 p. c.) Average showing defect in both eyes. RECAPITULATION. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 8 3 | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 76 25 12 72 8/11 27 3/11 33 1/6 78 26/33 21 7/33 9 37/100 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60, 3 per cent.) Average showing defect in both eyes. PEISONS. Question not answered. Question answered (10, 5, 10, 6, 20, 24/47, 14 1/10 p. c.) Average showing defect in both eyes. RECAPITULATION. Question not answered. Question not answered. Question not answered in both eyes. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 8 3 | 27 3/11 33 29/50 Per Cent, 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 76 25 12 72 8/11 27 3/11 33 1/6 78 26/33 21 7/33 9 37/100 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question answered. Question answered. Question answered from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered Question answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60, 3 per cent.) Average showing defect in both eyes. PRISONS. Question not answered. Question not answered. Question answered (10, 5, 10, 6, 20, 24/47, 14 1/10 p. c.) Average showing defect in both eyes. RECAPITULATION. Question answered. Per cent. showing defect in both eyes, as averaged from Per cent. showing defect in both eyes, as averaged from | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 8 8 7 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 76 25 12 72 8/11 27 3/11 33 1/6 78 26/33 21 7/33 9 37/100 75 2/3 23 1/3 |
| Question answered (9.75, 90, 1 per cent.) Average showing defect in one eye. Question not answered. Question answered (20, 5, 2, 2, 1 13/47, 7 per cent.) Average showing defect in one eye. RECAPITULATION. Question not answered. Question answered Per cent. showing defect in one eye, as averaged from answers received. QUESTION III.—WHAT PER CENT. SHOW DEFECT JUVENILE REFORMATORIES. Question not answered (8, 10, 15, 15 per cent.) Average showing defect in both eyes. INTERMEDIATE REFORMATORIES. Question not answered (36½, 60, 3 per cent.) Average showing defect in both eyes. PEISONS. Question not answered. Question answered (10, 5, 10, 6, 20, 24/47, 14 1/10 p. c.) Average showing defect in both eyes. RECAPITULATION. Question not answered. Question not answered. Question not answered in both eyes. | 3 Number. 27 6 47 13 IN BOTH Number. 12 4 8 8 7 | 27 3/11 33 29/50 Per Cent. 81 9/11 18 2/11 6 10/47 78 1/3 21 2/3 12 3/20 EYES? Per Cent. 75 25 12 72 8/11 27 3/11 33 1/6 78 26/33 21 7/33 9 37/100 |

| 120 | | | |
|--|-----------|---------|---------------------|
| QUESTION IV.—ARE GLASSES PRESCRIBED FOR FROM REFRACTIVE ERROR? | THOSE | SUFF | ERING |
| JUVENILE REFORMATORIES. | | | |
| Overties and and the state of t | Number. | | er Cent. |
| Question answered in the affirmativeQuestion answered in the negative | 13 | | 1 1/4 |
| Question not answered | 1 2 | | 8 1/4 2 1/2 |
| | | 1 | 2 1/2 |
| INTERMEDIATE REFORMATORIES. | | | |
| Question answered in the affirmative | 10 | 1 | 9 10/11 |
| Question answered in the negative | • • | | |
| Question not answered | 1 | 1 | 9 1/11 |
| PRISONS. | | | |
| Question answered in the affirmative | 00 | 0 | 4 00 (00 |
| Question answered in the negative | | | 4 28/33 9 1/11 |
| Question not answered | | | 9 	 1/11 	 6 	 2/33 |
| | ~ | | . 2/00 |
| RECAPITULATION. | | | |
| Question answered in the affirmative | 51 | 8 | 5 |
| Question answered in the negative | | | 6 2/3 |
| Question not answered | . 5 | | 8 1/3 |
| OTIESTION V HAS THERE DEEN NOTICEABLE IN | INOTE NA | TOTAL Y | AT PRETER |
| QUESTION V.—HAS THERE BEEN NOTICEABLE IMP | | | |
| PRISONERS' DEMEANOR, CONDUCT, OR PROGRES | | | OR |
| WORK AFTER WEARING GLASSES FOR C | CORRECT | ION | |
| OF OPTICAL DEFECT? | | | |
| JUVENILE REFORMATORIES. | | | |
| Question answered in the affirmative: | Number. | · P | er Cent |
| Demeanor | | 1 | |
| Conduct | 3 | 1 | |
| School | | 4 | |
| Work | 4 | 2 | |
| Question answered in the negative | | E / | |
| Question not answered | . 8 | 50 | , |
| INTERMEDIATE REFORMATORIES. | | | |
| Question answered in the affirmative: | | | |
| Demeanor | 5 | 4 | 5 5/11 |
| Conduct | | 4 | |
| School | | 5 | |
| Work | | 4 | |
| Question answered in the negative | | 1 | |
| Question not answered | 3 | 2 | 7 3/11 |
| PRISONS. | | | |
| PRISONS. | Number. | P | er Cent. |
| Question answered in the affirmative: | | | |
| Demeanor | 12 | 3 | 8 4/11 |
| Conduct | 12 | 3 | 8 4/11 |
| School | | | 2 14/33 |
| Work | 15 | 4 | |
| Question answered in the negative | | 1 | |
| Question not answered | 13 | 3 | 9 13/33 |
| RECAPITULATION. | | | |
| | | | |
| Question answered in the affirmative: Demeanor | 20 | 3 | 3 1/3 |
| Conduct | | 3 | |
| School | 27 | 4! | |
| Work | 24 | 40 | |
| Question answered in the negative | 8 | 13 | |
| Question not answered | 24 | 40 |) |
| OTTESTION HI DO NOT HAVE AN OCHLIST PEGI | TT ADT 37 | TITELL | n metra |
| QUESTION VI.—DO YOU HAVE AN OCULIST REGI | LAKLX | VISI. | r THE |
| INSTITUTION? | | | |
| JUVENILE REFORMATORIES. | | | |
| 0. 11.1 | Number. | | er Cent. |
| Oculist | | | 7 - 1/2 |
| OpticianQuestion answered in the negative | 8 | 50 | |
| Question not answered | | 1 | |
| Anontron was ampliated the second to the sec | _ | 4. | -/- |
| | | | |

| INTERMEDIATE REFORMATORIES. | |
|--|---|
| Oculist 5 | 45 5/11 |
| Optician | 9 	 1/11 	 45 	 5/11 |
| PRISONS. | , |
| Oculist | 36 4/11 |
| Optician | 6 2/33 54 6/11 |
| Question not answered 1 | 3 1/33 |
| RECAPITULATION. | 00 10 |
| Oculist | 38 1/3 5 |
| Question answered in the negative | 51 2/3 5 |
| QUESTION VII.—IS THERE ANY STATE APPROPRIATION TO | PAY FOR |
| EXPERT OPHTHALMIC EXAMINATION? | |
| JUVENILE REFORMATORIES. | Dan Cant |
| Question answered in the affirmative 4 | Per Cent. 25 |
| Question answered in the negative | $\begin{array}{ccc} 62 & 1/2 \\ 12 & 1/2 \end{array}$ |
| INTERMEDIATE REFORMATORIES. | 12 1/2 |
| Question answered in the affirmative 1 | 9 1/11 |
| Question answered in the negative 10 | 90 10/11 |
| Question not answered | |
| Question answered in the affirmative 5 | 15 5/33 |
| Question answered in the negative | 84 28/33 |
| Question not answered | • • |
| Question answered in the affirmative | 16 2/3 |
| Question answered in the negative 48 | 80 |
| Question not answered | , , |
| QUESTION VIII.—WHAT IS THE AVERAGE AGE OF INMATES INSTITUTION? | OF THE |
| JUVENILE REFORMATORIES. | |
| Question not answered | Age, years. |
| Average age, as averaged from answers received | 14 |
| INTERMEDIATE REFORMATORIES. | |
| Question not answered | 21 |
| PRISONS. Number. | Per Cent. |
| Question not answered | 32 |
| RECAPITULATION. | 4.4 |
| Juvenile reformatories | 14 21 |
| Prisons | $\frac{32}{221/3}$ |
| | , - |
| QUESTION IX.—WHAT IS THE AVERAGE POPULATION OF | THE |
| JUVENILE REFORMATORIES. | Average Population. |
| Question not answered | 320 |
| INTERMEDIATE REFORMATORIES. | |
| Question not answered | 017 |
| Average population from answers received | 617 |
| Question not answered 2 | |
| Average population from answers received | 737 |
| | |

| RECAPITULATION, | Average population. |
|---|--|
| Average population of all institutions | 524 2/3 |
| Highest juvenile reformatory population | 750 1,510 |
| Highest intermediate reformatory population | 2,100 |
| CONDITION ON ADMISSION TO THE NEW YORK STATE REF | ORMATORY |
| AT ELMIRA OF FIVE THOUSAND INMATES RECEIVE | |
| BETWEEN 1900-1906. | |
| Average age | Per Cent. |
| Addicted to the use of alcohol | 54 7/10 |
| Suffering from syphilis | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| Suffering from defective eye-sight 675 | 13 1/2 |
| Suffering from defective hearing | 5 5/8 |
| | 010 |
| REPORT, EAR, NOSE AND THROAT. | |
| *************************************** | 190 |
| To Acting General Superintendent: | |
| Name | |
| | |
| Hears ordinary R | |
| Pathological changes | |
| Remarks | |
| ••••• | |
| ••••• | |
| | |
| OCULIST'S REPORT. | |
| *************************************** | 190 |
| To Acting General Superintendent: Name | |
| Complaint | |
| Inmate's statement (R | |
| of vision. \ \(\(L \) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ | |
| Distance § R | |
| refraction. \ L | |
| (R | |
| Javal's ophth. | |
| | |
| Diagnosis. | |
| Treatment and remarks | |
| | |
| | |
| DISCUSSION | |

ON PAPERS BY DRS. CASE AND BAKER.

Dr. C. S. Means, Columbus, Ohio, said that the paper of Dr. Case is not only interesting, but very instructive, especially so to him on account of his position as president of the school board of Columbus, having had eight years' service on that board. He had been investigating along this line for several years. Last year he talked with all the teachers of Columbus and had them make records of the hearing and sight of the children in their respective rooms. Each building was given a test-type and instructed how to make records of any defects found. Also a test was given them of how to record defective hearing. Mouth breathers were also to be reported. There was special attention given all the boys and girls who were marked stupid or slow, to find out whether or not they had more defects of this

kind than the brighter ones. To Dr. Means' surprise, they reported nearly 90 per cent. of the children they had graded as poor, stupid, and the very bad boys and girls had one or all of the defects above named, and were unfortunate rather than bad. He is of the opinion that every scholar in the schools should be examined carefully by a competent physician, and those who need attention should be directed to their choice of a physician, and, if too poor to pay for the work, should have it done by a doctor employed by the board. If the people would spend more money in preventing these troubles they would be excused from paying such an enormous amount to maintain penal institutions, and thereby not only save many a poor unfortunate child from a life of disgrace and crime, but also lessen the amount of taxation. He hoped Dr. Case would continue his good work, and prove to this country that no penal institute is complete without a paid corps of specialists in every line.

His friend, Dr. Baker, always has something of interest to say, and his paper was of great interest. The subject of migraine always brings a vision of headache, from which Dr. Means had suffered all his life, and also every member in his family, six in all. He believed Dr. Baker is not putting it too strongly when he says that a great percentage of these patients, if properly fitted, may be cured. Too many oculists do little more than the opticians, and therefore fail in results. Dr. Means knows by his experience, having had a number of oculists refract him both with and without a mydriatic, with very little success. He had had a good deal of relief, however, the last few months with a pair of lenses that he was then wearing. They consist of a prism both vertical and horizontal, along with a very weak cylinder and convex sphere. He believes with persistent wearing of these glasses he will be almost free from this malady. Too many people expect absolute relief at once, and he is firmly of the opinion that eyes change very rapidly, especially those that have been under such a strain, and oftentimes lenses properly fitted will be wrong in only a few weeks. This should be corrected, the patient kept under care for months in these severe cases, and the lenses should be changed as often as any defect appears.

Dr. Vall, Cincinnati, said that every good thing has a few drawbacks and the drawbacks which are encountered in examining the eyes of children in the institutions and public schools should be admitted. Every year several children come into his office with their parents, stating the teacher had complained that they could not see and that the eyes should be attended to. Examination revealed that the eyes were normal, but the vision was not normal. The child had had suggested to its mind that there was something wrong with its eyes, and it took on that idea and assumed blindness. When he handed them picture-books and a printed page, they said they could not see anything at all. These were hysterical conditions brought on by the examination of the eyes by enthusiastic oculists or opticians. He thinks this is a thing which ought to be considered, and if it occurs in one-half or one per cent. of cases, it should be known and recognized, and safeguarded against.

Dr. Reber, referring to Dr. Case's paper, said that Dr. Risley had done some splendid work among the feeble-minded children at Elwyn, Pa. They have been found to be defective in vision in a large percentage of cases. They should be looked on as stigmata of degeneration. Migraine increasing after 40 is likely to be muscular. If not, why does not their migraine improve as does that of many a hypermetrope? As to heredity and migraine he thinks what muscular anomaly there may be present is likely to be due to peculiarities of orbital formation. The peculiar shape of the head is what is transmitted from generation to generation and what may apparently point to the migraine that rescinds through some generations of a whole family.

Dr. Minney said he could confirm what Dr. Baker said. Dr. Baker is always doing good.

Dr. Case said that there is much to be said, pro and con, on this important subject, but lateness of hour precludes it. Suffice it to say, that prison officials and legislators should be made to understand that much detail work is necessary in carrying on ophthalmic examinations among prisoners, and adequate funds should be appropriated, as is done for other kinds of medical attention. Replies to circular letters indicate how indifferent prison officials are to the condition of eyes of inmates. Many ridiculed the idea that eye defects hear any relation to crime. Evidently their attention had not been drawn to it. In other words they lack education on this subject. This is not surprising, as an ignorance existed among the medical profession regarding deleterious effects of eyestrain, until recently. Legislators are generous with appropriations for salaries of officials, new buildings, etc., but scarcely give any thought to the importance of ophthalmic examinations among prisoners. Ametropia does exist to a surprising degree, among the younger class of criminals, especially, and its correction will do much to enhance the educational method of handling them.

Dr. Casey Wood said he attempted a year ago, previous to the meeting in Buffalo, to obtain some statistics bearing on the relation of migraine to ametropia and muscular imbalance. He thinks he defined what is generally known as migraine and he gave a definition similar to that of Dr. Baker, and set forth the well-known symptom-complex of ordinary "sick" headache. In spite of this, in a great many of the replies he received, it was assumed that migraine and ocular headaches are synonymous terms. Dr. Baker has taken probably a better method for insuring correct replies and in obtaining the results of treatment. Dr. Wood is under the impression, that those who seemed to understand his picture of migraine believed that from 5 to 15 per cent, are cured by means of glasses. This was the average opinion, although some observers asserted that they never had a single patient cured by ocular treatment, while a few others thought the proportion of cure to be, in their experience, higher than 15 per cent. Personally, he inclines to the lower of the two figures given and regards the condition as a true neurosis, rather than symptomatic of eyestrain.

Dr. Baker, Cleveland, Ohio, said that the one thing that impressed him more than any other in the statistics presented in the paper, was that they were so much more favorable than he anticipated they would be. He feared that many of the cases corrected and never heard from again were not relieved but in such cases he almost invariably received favorable replies. On the other hand, the patients that were not benefited came back frequently and protested loudly. He sometimes thought he was too optimistic, but a careful study of these statistics he thought must convince the most pessimistic that a majority of his private patients, at least, are relieved if not cured.

HIGH HYPERMETROPIA.

THEODORE B. SCHNEIDEMAN, A.M., M.D. Professor of Diseases of the Eye, Philadelphia Polyclinic. PHILADELPHIA, PA.

High hypermetropia possesses, in addition to certain features common to hypermetropia in general, certain phenomena which are peculiar to itself. The diminution in the diameters giving rise to the small eyeball is an exaggeration of what is characteristic of ordinary hypermetropia. This diminution is ascribed to lack of development. But the special conditions or occasions responsible for such failure to develop normally have not been discovered, lying as yet hidden in the obscurity which prevails in the domain of heredity and development in general.

The diminished radius of curvature of the cornea which has frequently been observed in cases of high hypermetropia and which would tend to increase the refraction seems to be a part of the diminution suffered by all of the ocular structures. The smallness of the globe would seem to favor more extended excursions, but this has not been found to be the case; the field of fixation of hypermetropes of this class has been found to be restricted; their mobility is inferior to the normal. The cause of this appears to be a weakness of the extrinsic muscles which have suffered from the same dystrophy as the other ocular structures. Even the ciliary muscle, contrary to what might be expected, has suffered similarly. range of accommodation has generally been found to be less than in normal eyes or than those affected with moderate error. nervous mechanism of such eves shares in the general inferiority. The ophthalmoscope furnishes positive proof of this as regards the optic nerve. The papilla not only seems smaller but calculation shows that it actually is so; moreover, it very generally presents an abnormality as to color, being at times paler than normal and in other cases of a deeper hue, so as to be scarcely distinguishable from the surrounding fundus; its outlines are often indistinct and irregular.

The retinal vessels present a peculiar disposition; they are tortuous and suggest in many cases the appearance of optic neuritis. Horner's hypothesis of this peculiarity that the retinal vessels make their way, so to speak, into a closed cavity already formed serves to explain these appearances.

A matter of capital importance in many of these cases is the defective vision which is frequently so marked a phenomenon in high hypermetropia. The diminished visual acuity has been ascribed among others by Donders to the fact that "a smaller number of percipient elements of the retina are affected than in emmetropia by reason of the diminished retinal images and that this discrepancy could only be compensated if a given smaller surface of the retina possessed the same number of percipient elements as the larger surface of emmetropic eyes." But Mauthner has shown that this can not be the cause, for axial hypermetropia as high as 12 D. could only in this way reduce the acuity from 20/20 to 17/20 when corrected by the accommodation. Moreover, the retinal images can be enlarged to be equal to or greater than in emmetropia by means of correcting glasses. Possibly the explanation is to be found in a disturbance of the development of the percipient apparatus, but anatomical proof of this has not been brought forward.

Every degree of amblyopia is encountered. Why should two individuals affected with the same amount of error possess such different visual acuities? It has seemed to the writer from his cases that the amblyopia is the more pronounced the older the subjects when they first began to wear glasses, as if the badly formed images of the uncorrected eye had failed to awaken the proper function of visual perception.

Very high hypermetropes requiring for their correction an excessive amount of accommodation hold near objects very close to the eyes, simulating myopia. In this way they see better, thanks to the increase in size of the retinal image; the objects, letters, etc., are indistinct but in bringing these close to the eyes, the circles of diffusion increase less rapidly than the images and the subjects have learned besides to further cut off such circles by nipping their lids.

It is frequently stated that such eyes are especially affected with astigmatism, but this has not been my experience. The records of my cases show that astigmatism is, to say the least, no more frequent in high hypermetropia than in other states of the refraction. in fact rather less. Nor is the astigmatism present apt to be particularly high. There are of course many cases of high hypermetropic astigmatism, but the cases I am considering are of much more numerous ones, where the axial defect predominates. It may be added that when a high degree of amblyopia is present low or even moderate astigmatism can only be recognized with certainty by objective methods, of which the shadow test is the best; the cylinder in these cases adds too little to the visual acuity to be certainly recognized by the subjective method.

As the eye is not a single point, but its anteroposterior axis nearly an inch in length, the question from what point ametropia should be

counted has been frequently discussed and is not settled even yet. In the lower degrees it is a matter of indifference, but in the higher correct ideas as to the optical constants of such eves and comparisons between different cases can only be made with exactness when the same reference point is chosen in each. Some writers think it most simple to choose the summit of the cornea as the point from which to measure the punctum remotum. They object to any of the cardinal points of the optical system, because these points do not occupy the same position in all eyes nor in all meridians of the same eve or even for all parts of the same meridian. From what point shall the punctum remotum be computed? The inverse of this distance is the measure of the ametropia. As it is a question of mathematics, it is preferable to select one of the cardinal points and not an anatomical point; for the cardinal points enter into the calculation concerning the dioptric apparatus, but the anatomical points do not. Donders chose to measure the degree of ametropia from the anterior nodal point—obviously because the images being reckoned from the second nodal point the conjugate of the first, their size was readily obtained. The objection to the nodal points are that these are not constant, but change their position during accommodation and in different stages of the refraction. He himself abandoned this point in aphakia. The first principal point is now generally chosen as the point from which to measure the punctum remotum; as a matter of fact in practice we may use this interchangeably with the anterior surface of the cornea without serious error, for the two are separated by only 1.75 mm.

Convergent strabismus is exceptional in high hypermetropia. This has given rise to some surprise on the part of writers. It has been regarded as in contradiction with Donders' theory of the connection between hypermetropia and convergent strabismus. Donders has himself answered this objection by urging that the hyperope, whose error is very considerable, does not even attempt its correction by excessive convergence; besides to correct a hypermetrope of high degree would require such an excessive amount of convergence as can not be maintained even if the accommodation is sufficient to correct the error. The deficiency lies in the power of convergence and not that of accommodation. On the other hand, divergent strabismus is not unfrequently met with. This is probably due to the imperfect development of the extrinsic muscles which share in the general dystrophy. Moreover, amblyopic eyes frequently lapse into divergence.

From recent extensive statistics by Tscherning as to the incidence of refractive anomalies among young persons in Copenhagen, practically no difference existed as regards the higher degree of hypermetropia among the educated and illiterate. What difference there was showed a slightly greater proportion among the illiterate. The same statistics, as usual, showed an enormous preponderance of low and moderate myopia among the educated classes, while the highest degrees of the latter were again equally divided among both.

Analysis of 6,000 individuals refracted by myself, with, of course, almost twice the number of eyes, excluding those that had but one eye, showed, of these 12,000, 222 having more than 4 D. of H. Of these, 16 had 7 D., five 8 D., and one 9 D., four 11 D., and one to be described more fully presently had 16 D. in one eye and 17 D. in the other.

As compared with the incidence of high myopia, the same material showed 304 eyes affected with myopia above 10 D.; these included cases from 10 D. to one of 29 D. The majority, of course, belonged to the inferior limit. Thus the number of cases in this group of 6,000 individuals were not very unequal, 304 of myopia to 222 of hypermetropia.

Hypermetropia of 14, 20 and 24 D. have been reported uncomplicated by serious disturbances of development. Perhaps the case of highest degree ever recorded was one communicated to Donders by Bowman, which required a convex lens of 17/8 inches for its correction. Calculation gives the anteroposterior axis and the sizes of the images in the uncorrected and corrected eye as follows: anteroposterior axis, 16.908 mm.; size of image linear (10 being normal), 9.587 in the uncorrected eye and 14.499 in the corrected eye. The correcting lens being placed 12 mm. from the anterior principal point, or 101/4 mm. from the summit of the cornea, so that the enlargement of the image produced by the glass, obtained by dividing the size of the image in the corrected eye by that of the uncorrected eye 1.514.

Following is a record of the case of high H. above referred to:

J. J. F., real estate agent, aged 28, born in Ireland. Father's sight poor; is unable to give further particulars. The sight of one sister is like his own. Up to the age of 17 he held near objects very close to the eyes so that he was thought to be near sighted. At that age he was given glasses which were of some assistance. He was told then by his oculist that his eyes had "stopped developing before they had been fully formed."

The external appearance of the eyes is highly suggestive. They are small, deep set, and seem more mobile than normal. The pupils are equal and react to light and convergence. The visual acuity

without glasses is ability to see large objects. Measurements of the cornea with the ophthalmometer gave the small radius of 7.1 right and left, corresponding to 49 D. without any astigmatism. The accommodation is 7 D. right and left. The ophthalmoscope showed that the media were clear. The details of the fundus came out clearly with very high convex lenses. The nerve appeared very small, slightly paler than normal, but not enough to warrant the opinion of atrophy, nor was there any other special fundus lesion. The shadow test showed the presence of 16 D. of hypermetropia in the right and 17 D. in the left eye in the visual zone, with moderate positive meridional astigmatism. There was a trace of astigmatism with the rule, but this did not measure as much as 0.50 D. The visual acuity was extremely poor, right and left 5/60, with the correcting glasses +16 and +17 D., respectively.

He was given this correction to wear steadily and reported from time to time that, while the vision was imperfect, the glasses were giving him greater satisfaction than he had heretofore had.

This is the highest degree of hypermetropia the writer has ever seen.

DISCUSSION.

Dr. Edward Jackson, Denver, said he considered Dr. Schneideman quite right as to the point from which it is proper to measure the hypermetropia. The very high hyperopes, which he had measured with an ophthalmometer, had none of them shown any lack of curvature in the cornea. There is a very slight curve. The ametropia must depend on diminished refraction of the lens or increase in the axial length. Perhaps the deficiency of accommodation sometimes marked in young patients, accompanied deficient development of the lens. In one case in a young man, when seen several years afterward, he seemed to have suffered a subluxation of the lens and his visual acuity was impaired in both eyes. He had lost light perception in one from glaucoma.

Dr. Reber mentioned three cases in one family that had from 11 to 13 diopters of hypermetropia with 2 to 3 diopters of astigmatism, and each one squinted. Dr. Jackson also saw one of these little girls. These cases were presented by invitation some years ago before the College of Physicians of Philadelphia. The ophthalmoscope showed grayish reflex, in the macula of these little girls, which has disappeared in the last year. There were two other children between the oldest and youngest of the three above reported cases, whose eyes were normal and practically emmetropic. The eyes of both parents were normal.

PRIMARY TUBERCULOSIS OF CORNEA.

EUGENE SMITH, M.D., AND HENEAGE GIBBS, M.D. DETROIT, MICH.

(Illustrated.)

Mrs. O. C. T., aged 44, weight about 170, in perfect health, consulted me Dec. 23, 1901. Left eye had troubled her for nine months, during most of which time she had been treated for interstitial keratitis. Pain was absent until about three months before consulting me, when a severe attack of an inflammatory character set in (glaucomatous). Status præsens.—Slight circumcorneal injection, cornea opaque except a line 2 mm. wide around the periphery. Luster of cornea normal—T + 2. Through the transparent margin of the cornea, a white growth could be seen filling about two-thirds of the anterior chamber, extending backward from the cornea. There was no evidence of corneal ulceration. I enucleated the eve the following day and had it examined at the Detroit Clinical laboratory, when it was pronounced tubercle of the cornea. There is no history of tuberculosis in her family, nor any further appearance of the disease in herself. There has never been any abrasion of the cornea.

The cornea was incised around about three-fourths of its circumference that it might be everted to expose the growth, which was seen to be trefoil in shape, consisting of three separate bodies, one quite large and two smaller ones, of smooth surface, occupying two-thirds of the cornea. Descemet's membrane was bulged, but not perforated.

A letter dated July 31, 1906, states with the exception of an attack of "erysipelas of the face" this summer there has been no sickness since the operation and no further evidence of tubercle.

TUBERCULOSIS OF THE CORNEA.

This small mass of tubercles occupied the posterior third of the cornea and was entirely confined to it, except at one small spot in the circumference, where a small tubercular mass had formed in the ligamentum pectinatum iridis, involving slightly the root of the iris and extending nearly to the pars ciliaris retinæ. It is evident, from the stage of its growth, that it was much younger than, and therefore secondary to, the larger growth in the cornea.

The tubercles in the cornea were in every stage of development and could be studied from their incipiency. In the anterior unaffected portion the lymph spaces between the laminæ were much distended; further back an increase of the corneal corpuscles was



Fig. 1.—Showing tumor in posterior portion of cornea.



apparent, and then numerous straight (not tortuous) blood capillaries appeared. These varied in size but were all capillaries,-had no muscle coat. In some places as many as six or seven radiated from a common center, and at this point the tubercles were formed. First there appeared numbers of small round cells staining deeply (leucocytes), then an alteration in the capillary blood vessels could be noticed, the walls became thicker and the nuclei in them increased, small protuberances having a closely packed row of nuclei in the periphery with a homogeneous center were formed and these gradually increased in size and became multinucleated, or giant, cells. In the larger ones the nuclei only appeared on one side of the periphery of many, the other side having been cut off in making the section. This process was traced in so many cases that there is little doubt the giant cells, in this case, were formed in this manner. I have seen them formed in a similar way from the tubuli seminiferi in tuberculosis of the testis.

The formation of such a number of blood vessels in an avascular structure like the cornea, and their relation to the formation of tubercles, is a very interesting point; and another is, that in none of these vessels was there any red blood corpuscles; there was complete hemocytolysis and the red cells were represented by brown iron free granules of hematoidin.

These tubercles were in some places formed in a more or less circular manner, enclosing a space where a process of degeneration appeared to be going on. The connective tissue corpuscles were becoming atrophied, and the ground work presented a granular appearance. Chemical reaction also was altered and it showed somewhat the appearance of fibrous connective tissue after too prolonged action of the x-rays through the epidermis. It was a process of necrosis, such as is seen in acute miliary tuberculosis in the lungs; it was not caseation.

A very careful examination of sections of this specimen for tubercle bacilli was made by two skilled observers working independently, and using several staining methods, and not a single bacillus could be found.

There are some very interesting points in this case. In the first place, as far as I know, it is the only one on record of true tuberculosis of the cornea, which it undoubtedly is morphologically. Then the presence of a toxin with such diversified action that it can cause the formation of numerous blood vessels in a structure which is normally without any, and this as the commencement of a morbid change, and at the same time possess such hemolytic power that it can destroy all red blood corpuscles in its field of action, places it in a position where we want to know more about it.

DISCUSSION.

Dr. Parker, said that during the past few months he had had occasion to review the literature on primary tuberculosis of the cornea, and had failed to find a single reported case in which the diagnosis was confirmed by the pathologist. The importance of such a case can not be overesti-He had had occasion during the past year to treat a case of suspected tuberculous affection of the cornea, a case that would have been classified (after Fuchs) as marginal keratitis. The tubercular test was positive. Not only was the typical temperature reaction obtained, but each nodule became surrounded by a well-marked vascular area. The tuberculin was continued as a therapeutic agent, as much as 400 milligrams being given in a single injection. The recovery, though slow, apparently is complete. There are still many conditions of the cornea about which very little is known and any agent that will aid in a diagnosis is surely most welcome. Dr. Parker believes if a tuberculin test were made, as a routine practice, on all corneal cases in which the diagnosis is obscure, a certain number would be cleared up. Present knowledge is too meager to warrant positive statements.

Dr. Alt, St. Louis, said he had never seen anything exactly like this microscopically, although he had recently seen classically a case of tuberculosis of the cornea which was, however, in all probability, secondary in character. It has been advanced of late that phlyctenules are to be looked on as a modified tuberculosis and some observers affirm that they have produced phlyctenules by injecting dead tubercle bacilli. He supposed primary tuberculosis of the cornea is not as rare as it would appear, though histologically it has not been seen often and as far as he knows, not at all in the same manner as reported here by Dr. Smith. The appearance of the sections, surely, is that of tuberculosis.

DR. Reber, Philadelphia, said that a study of the subject will show that ocular tuberculosis will sometimes masquerade as a form of keratitis. True, the question of endogenous infection will obstruct the diagnosis very much. He had had under observation for two or three months a case in which the tuberculin test proved negative. Another case was very suggestive of ocular tuberculosis. There was no thrombosis and no intraocular tumor, but a peculiar formation in the anterior chamber very like the one described in this paper. It was negative to syphilitic treatment. He thought it was an endogenous infection.

Mr. Gunn, London, said he had never seen a case of primary tuberculosis of the cornea, and thought this one of great interest and most probably unique. He had been long in the habit of regarding phlyctenules as tuberculous in character. When he was working in the Children's Hospital he was convinced of these being tuberculous in character, although he never found the tubercle bacilli, because the children would develop every characteristic of tuberculosis.

DR. WILLIS, Indianapolis, said he was not at all acquainted with primary tuberculosis of the cornea but had made a study of primary tuberculosis affecting other parts of the body. It seemed to him that there is a weakness in the report of this case, in that the reporters did not mention that antisyphilitic treatment had been thoroughly tried, or that inoculation or cultures had been made. The proof positive of either primary or secondary tuberculous infection of the cornea or elsewhere in the body, is the presence of the organism which causes tuberculosis in the affected tissue, as shown by specially stained histologic specimens, inoculations with consequent tuberculosis, or growth on proper culture medium. If the organism is not found in the stained section, the histologic pictures of tubercle and syphiloma are practically alike, and he is confident no pathologist



Fig. 2.—Vertical section, showing part of tubercle and anterior portion of cornea with epithelium.

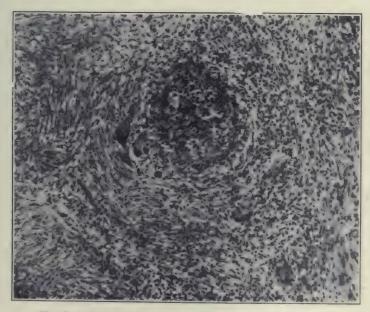


Fig. 3.—Tubercle before degeneration has commenced.





Fig. 4.—Newly formed blood vessels.



Fig. 5.—Showing tubercle in base of iris. Secondary.



would affirm that a given section showed tubercle unless he could find present the bacillus tuberculosis. Although the differential microscopical diagnosis depends on the presence of the bacillus tuberculosis, it can not be said, however, that the absence of this organism is positive evidence that the condition is syphilis. In his discussion of this paper, Dr. Parker said that he believed tuberculin was a positive diagnostic agent in tuberculosis, and regretted that it had not been used in this case. Dr. Willis could not agree with this view regarding the use of tuberculin as an invariable accurate test for tuberculosis, for he had in mind a case of primary tuberculosis of the throat, the curettings and sections from which showed, in section, the bacillus tuberculosis, and yet the tuberculin test administered the patient by Dr. George Dock of the University of Michigan, was negative or rather not positive reaction. Dr. Willis therefore thought that this case may be considered possible or probable primary tubercle of the cornea. He hoped that Dr. Smith would speak regarding the culture and inoculations if they were made in this case, and regarding the use of antisyphilitic medication, if it were tried.

DR. ALBERT E. BULSON, JR., Fort Wayne, Ind., said that the efficiency of tuberculin as a diagnostic agent depends very largely on the dose employed. Some tuberculous cases give no reaction when small doses are administered, but respond promptly and decidedly to large doses. A two hour record of the temperature for two or three days should precede the test, and the initial dose for an adult should be 5 milligrams. If no reaction occurs a second dose of 10 milligrams should follow in the course of two or three days. Failure to secure reaction from the 10 milligram dose will warrant the administration of a 15 or even 20 milligram dose, and he knew of a case of tuberculosis which responded to nothing under 25 milligrams. In his own practice he did not feel warranted in excluding a diagnosis of tuberculosis in suspected cases until he had failed to obtain a reaction from everything under 25 milligrams of tuberculin, though it is only in exceptional cases that this maximum dose will be required to produce a reaction when tuberculosis is present. He considered the test one of the most valuable diagnostic aids.

Dr. Jackson, said that twenty years ago he first saw a case, and had seen the patient from time to time since, until five years ago, that he regarded as a case of primary tuberculosis of the cornea. He thought it was also so regarded by the ophthalmologists who had the patient under their care most of the time. She spent her summers where he commenced practice. The lesion first involved the margin of the cornea; later there was an involvement of the uveal tract. The case had some acute exacerbations in one eye, and then the other eye became infected and ran the same course. The ultimate result was considerable opacity, adhesion and partial atrophy of the iris, and vision reduced to mere light perception. The patient had a good family history, and was one of a series of healthy children. From the course of the antisyphilitic treatment, syphilis could be excluded. The patient's general health at the time, certainly for two or three years, was considerably below par. There was some anemia, probably due to the influence of the toxins of the bacilli. Subsequently the health became good and the eyes became quiet, but with bare light perception.

DR. LAMB, Washington, emphasized what Dr. Willis said. He did not think Dr. Smith had proven this to be a case of primary tuberculosis of the cornea. Dr. Lamb believes that all subacute or chronic inflammations have a giant cell, whether tuberculous or not, and he failed to see that Dr. Smith had proven his case without the tubercle bacillus being present.

Dr. Casey A. Wood, Chicago, said there may be tuberculosis of the cornea without its involving the anterior epithelium. In a case which he had recently, in which it was suspected to be, and had by others been diagnosed as tuberculosis of the cornea, after two weeks' treatment by tuberculin there was not the slightest reaction whatever. It was finally established that it was a case of Fuchs' sclerosis of the cornea, the result of a scleral infection, the smooth, yellow exudate in Bowman's membrane being a secondary deposit.

Dr. Smith, Detroit, said he was entirely in the hands of the pathologist in this matter. He did not make cultures himself. It was the pathologist's report he read. He did not enter into the question of syphilis; the patient was treated for three months with iodid of potash, iodid of mercury and protoiodid on general principles. There was no reason to suspect it. She was a married woman, living in the country, and no history that would point to that. He discovered the large tumor in the anterior chamber, with tension plus 2, and a severe pain of a glaucomatous character, and he supposed it was an endothelioma. According to Dr. Smith's teachings, tubercle bacilli are not found in all cases. Cultures were not made. That it was primary and that it was creeping down toward the ciliary region was shown clearly by one of the plates. He had not the slightest question but that it was tuberculous. That it was not syphilitic there is no question, not only from their surroundings, but for three months she had the treatment and the little opacities commencing in the center and extending to the periphery. The route of infection was the center of the cornea.

PUNCTATE OR HYALINE OPACITIES OF THE POSTERIOR LENS CAPSULE.

W. F. MITTENDORF, M.D. NEW YORK.

Under the name of cataracta polaris posterior spuria, or false pesterior polar cataracts, we know certain opacities of the posterior capsule of the lens, which are usually found in the region a little internal of the posterior pole of the lens or, more properly speaking, in the region of the attachment of the hyaline artery during the growth of the eye in intrauterine life. These opacities vary in size and, according to the remaining portion of the hyaline artery, may be of the size of a hempseed, or only a small dot may indicate where the attachment of this artery was. Some of the larger cataracts of this kind may even show remains of previous vascularity. Cases of this kind have been reported many years before the discovery of the ophthalmoscope.

In the great majority of cases, however, these opacities are much smaller and vary from the size of a poppyseed to a point resembling the prick of a pin. In some cases these aggregations appear to be only faintly attached to the posterior lens capsule and have a certain amount of mobility which is easily discovered on having the patient move the eyeball. However, the great majority appear to be on the posterior surface of the lens capsule and move, like all such opacities, in an opposite direction to the movement of the eveball. These cataracts, if we may call these little dot-like opacities by such a formidable name, differ very much from the true posterior polar cataracts which we are all familiar with and which may be likewise congenital, the result of chorioidal disease during intrauterine life, but which in the great majority develop later in life as the result of disturbed nutrition due to and accompanying certain diseased condition of the eye, of which a myopic chorioiditis is perhaps the most frequent one. Opacities of the kind of which I wish to call your attention to to-day are not located at the center of the posterior lens capsule, but to the inner or nasal side of it. They are much smaller and more rounded in shape, occur, as a rule, in healthy eves; they show no tendency to grow larger, and they do not affect the acuity of vision of such eyes. They are so small that they can not be seen by the naked eye nor by oblique illumination, and only the ophthalmoscope reveals their presence, and consequently we do not find any mention of them by earlier writers, although more marked opacities of this kind spreading on the posterior capsule have been described by von Ammon as early as 1832. On account of their small size and the fact that they are at one side of the lens, they are apt to be overlooked, which, perhaps, is no misfortune, as they have no pathological significance. In fact, nearly all of our text-books take very little notice of them, the majority do not even mention them, but they are very puzzling to the beginner in the use of the ophthalmoscope. They are most frequently discovered in refraction work, as their presence is more easily overlooked in inflamed eyes on account of the sensitiveness of such eyes and the importance of other symptoms accompanying such conditions.

What I wish to call your attention to is the great frequency they are met with. In 1892 I reported at the meeting of the American Ophthalmological Society the results of my former investigations, which showed that they were met with in more than 1 per cent. of all persons examined. As it is apt to be in such investigations, we sometimes do not see a single case in several weeks, only to meet with three or four of them in a single morning.

Subjectively, these spots cause no annoyance whatever, as they do not interfere with normal vision and apparently do not give rise to the annoying museæ volitantes, as patients have complained to me of them as appearing as often in the eye perfectly clear as in the one with the hyaline spot. I have never seen these spots lead to pathological changes, even after many years of observation of the same patient, and they are met with in adults as frequently as in children. I have seen them in very young children as well as in very old persons. I have also seen them in cases of beginning senile cataract where the senile changes were not connected with them in any shape or manner. Nor does the refractive condition of the eye nor the sex have any relation to them, but in some of the imperfectly developed eyes they are apt to be met with a little more frequently. However, the number of such eyes examined has been too small to lay much stress upon this. In some cases I have had reason to believe that in the course of a number of years that they had been under observation they became a little smaller and sometimes seemed to disappear in a few isolated cases. These cases all occurred in younger persons and perhaps a process of absorption took place here.

Another fact which the statistics below confirm is the much greater frequency with which they are met with in the right eye. I have tried to explain this by the assertion that, the circulation being more active on the left side, it being nearer to the heart, the process of retrogressive change in the hyaline artery and the canal of Cloquet is apt to be more complete here, whereas on the right side this process is perhaps more easily disturbed and the point of attachment of this vessel and sometimes certain portions of its canal—it having no accompanying vein—are not completely obliterated and remain as small opacities on the posterior capsule of the lens or sometimes a little behind it, but still remaining attached to it.

Several cases of remaining hyaline artery which I had occasion to observe confirmed my conviction that these spots always indicate the point of attachment of this vessel to the posterior lens surface. The fact that they are not found anywhere else on the lens, especially not in the center of the lens, is explained by the fact that the hyaline artery reaches the lens always more toward its nasal border.

I will now, briefly, give you the results of 10,000 patients, or 20,000 eyes, examined by me personally for this condition in my private practice.

There were found altogether 145 eyes with this condition—in the right eye, 108 cases; in the left eye, 24 cases; in both eyes at the same time, 13 cases; sessile or as opacities of the capsule, 137 cases; floating but connected with the lens capsule. 8 cases. Of these 145 cases, 4 occurred in abnormal eyes, and in 20 cases the eye

with the hyaline spot was decidedly the better eye, and in only 12 cases was this eye much poorer than the other eye, and then the defect of vision was due to other causes.

Of the total number, 22 occurred in hypermetropic eyes, 20 occurred in myopic eyes, 22 occurred in presbyopic eyes, 68 were astigmatic, and in 13 cases the refraction was either emmetropic or not mentioned on account of other more important conditions.

In regard to sex, 83 were found in females, 56 were found in males, 6 in very small children. The greater frequency of the females is easily explained by the fact that they were in the majority of my patients.

DISCUSSION

Dr. Würdemann, Milwaukee, said that transillumination of the eye will show these spots over the posterior capsule in a larger proportion of cases than any other known means of examination, and to a surprising number.

Dr. Wood, said that he was the first after Dr. Mittendorf, to see these opacities in the posterior lens capsule, and he saw them in his office. Dr. Mittendorf's paper is also of interest because of the reference to the hyaloid artery, and its relation to the ocular apparatus of certain lower animals in which the hyaloid artery exists as a normal condition. In man it is undoubtedly vestigial. The best account of this congenital condition is given in a monograph on the subject by an American, deBeck, of Seattle.

THE TREATMENT OF ACUTE SUPPURATIVE DACRYOCYSTITIS.

LEE MASTEN FRANCIS, M.D.

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BUFFALO, N. Y.

With a full realization of the vast amount that has been written on the subject of acute suppurative dacryocystitis, I venture to take up the topic, believing that any new method of treatment that may bring success in handling some of these cases will interest the members of this academy.

Without going into a lengthy consideration of the underlying pathology of dacryocystitis, suffice it to say that most writers and observers agree that stricture of the lacrimal duct is the causal factor in the majority of cases. The stricture may be cicatricial, or the result of an agglutination of the canal walls due to inflammatory swelling of the erectile tissue lining it, or as Fuchs suggests, in the new born, a plug of epithelial débris. Given a stricture, infection and suppuration are natural and expected sequences.

All treatment measures, however varied and different, have for their common object, the rapid suppression of the pus and dilatation of the stricture. Successful treatment depends upon the rapidity with which these two ends may be brought about. It is the treatment of the early pus stage to which I wish particularly to call your attention. By a series of experiments upon normal subjects I found that antiseptics could be driven into the lacrimal sac by means of inunction through the overlying skin surface. Ichthyol, unguentum Credé, unguentum hydrargyri, iodin and several others were tried. Without exception the secretion of the nostril draining the side massaged showed the presence of the antiseptic employed, in less than half an hour. These results led to the employment of inunctions in infected cases. The method of treatment is as follows: If the puncta are not patent, they are freely dilated so that upward massage on the sac will readily empty it of pus. In none of my cases has it been necessary to slit the canaliculus in order to insure thorough expression. In most instances I think it is a needless proceeding, and in its after effects, sometimes harmful. The patient is shown how to keep the sac well drained of pus by frequent gentle upward stroking. Constant application of the ice bag is ordered and an inunction every two hours thoroughly massaged into the skin overlying the lacrimal sac. In selecting an inunction, the best results have been obtained from unguentum hydrargyri 50 per cent. and unguentum Credé. It has been my uniform experience that the quantity of pus commences to lessen rapidly and has decreased to a minimum or disappeared in from three to five days.

I doubt very much if it is sound surgical practice to irritate, if not usually wound, a delicate, small canal already inflamed and swollen and enclosed in unvielding bone. So the probe is not used until pus has disappeared or nearly so, and then only with the greatest care and with nothing but the most gentle pressure. At the first probing a No. 3 or 4 Theobold is employed, having first injected the sac with a solution of adrenalin and cocain in order to contract the erectile tissue. After persisting with gentle pressure for sometimes as long as 30 minutes, the tissues gradually relax, permitting the probe to go through, without lacerating the canal and without pain to the patient. After allowing the probe to remain in situ for some time, it is withdrawn. The sac and canal are then freely irrigated with potassium permanganate solution 1/5,000. Permanganate is preferred to astringents. After irrigation the sac is filled with 25 per cent. argyrol solution which is allowed to remain. Subsequent probings are continued with decreasing frequency. Inasmuch as I do not slit the canaliculus probes larger than Theobold 9 or 10 are not used.

I regret that I can not furnish you with complete clinical records. It seems the irony of fate that in my clinical and private practice few of these cases have appeared during the past ten months. My observation is therefore limited to 23 cases. All of these made rapid and satisfactory recoveries under the treatment indicated above, with but one exception. That was a case that came to my dispensary clinic at the Emergency Hospital with a well developed lacrimal abcess about to rupture. This was drained through the skin. The incision closed spontaneously within four days, when the same treatment as in the other cases was instituted.

Although nasal disease and other predisposing causes, both local and systemic, have not been mentioned, especially the latter must demand the surgeon's attention. In conclusion, I wish to lay emphasis on the fact that this treatment is not regarded as the best adapted to all cases, for I am sensible that there are instances where the more radical measures in vogue may give better results. On the other hand I am not so sure that we have been too conservative in the handling of these cases in the past. The simplicity of the inunction recommends it. It may be carried out by the patient, making home treatment possible where otherwise there might be a lack of it. It is manifestly harmless. It is not offered as a substitute in any way for more skilled measures that may be undertaken by the surgeon in the office. The result thus far has been successful enough that I offer it to you for what it is worth.

482 Delaware Avenue.

DISCUSSION.

Dr. Hubbell said he had had no experience whatever along the lines indicated by Dr. Francis' paper, and was therefore unprepared to discuss it from that standpoint. He noticed that Dr. Francis combines three distinet methods in his treatment: First, drainage of the lacrimal sac, at least partially, through the probing of the canaliculi when the swelling is not so great as to prevent it; second, massage of the affected parts; third, the application of the Crédé ointment. The drainage, when practicable, is of first importance and essentially curative. The massage may also have some beneficial effect by facilitating the removal of inflammatory products from the sac. Dr. Hubbell could not speak concerning the penetration of the Crédé ointment to the extent which Dr. Francis feels warranted in claiming. But the determination, definitely, of its therapeutic value as he applies it would be more satisfactorily established, if it were used alone without resorting to some form of drainage of the sac. Dr. Francis said he would be interested to learn the results of its use in this way. In this connection it should be considered that acute dacriocystitis is not always an inflammation of the lining of the sac, but is more frequently one of the outer tissues of the sac, and is, more properly speaking, a pericystitis. This is why the suppuration so often finds vent through the skin. If drainage could be effected through the lacrimal canals by probing, which, at the same time, would cause the inflammatory products to discharge through the mucous membrane into the sac, this alone would go a long way toward effecting a cure without the usual abscess and rupture externally.

Dr. Minney thought that the success of the treatment depended on the massage.

Dr. Seaman, Milwaukee, said that in cases of this disease, in which there is a lesion of the sac, it is sometimes dangerous to use such remedies as argyrol, because of its well-known penetrating qualities. It gets into the loose tissue surrounding the sac and gives an annoying discoloration. He knew of one such case in the practice of a confrére. He mentioned it merely as a possibility.

Dr. Buxton, referring to the first section of the paper, doubted if a true stricture is often the cause de novo of acute dacriocystitis. An occlusion or obstruction of the nasal duct is caused by mucopurulent material, often mixed with foreign organic particles, or an inflammation of the surrounding tissues of the duct. This will be found rather than a deposit of abnormal tissue or cicatricial changes in acute dacriocystitis. Haab suggests this same thought when he writes: "The permeability of the lacrimonasal duct may persist in spite of the inflammatory process, the intensity of which depends more on the presence of infectious material and its entrance into the surrounding tissue, than on the degree of stricture." In the west many patients come for relief from the sandy plains, where evidently the first cause of the affection is irritation or a traumatism from small particles of sand being carried into the duct. In Dr. Buxton's opinion the installation of argyrol was the greatest factor in the successful treatment of these cases, rather than the inunctions employed.

Dr. Francis, referring to Dr. Hubbell's remarks respecting the probe, said he was careful to say it was not used until the acute inflammation had subsided. He did not know about the curative value of massage alone. It is a good point. Of course the sac must be kept well drained. He has never had discoloration from the use of argyrol; possibly the sac was injected too enthusiastically. Referring to Dr. Buxton's question as to true stricture, Dr. Francis said he mentioned it might be cicatricial or an agglutination of the canal walls, due to inflammatory swelling. He agreed with Dr. Buxton that in acute cases this is the condition. Argyrol is not injected into the canal and sac until the acute inflammation has disappeared.

SYPHON EYE COMPRESS.

O. A. GRIFFIN, M.D.

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ANN ARBOR, MICH.

(Illustrated.)

Several years ago, while treating a number of aggravated and prolonged acute inflammatory diseases of the eye, it occurred to me that, instead of employing the ordinary ice bag, which is often irritating to the eye on account of its weight and projecting irregular contents, it would prove more rational to use a tiny water bag and keep its contents at a uniform temperature by syphoning a

small stream of water through the bag. In my experiments, small coils of tiny rubber tubing were tried instead of the water bag, but found that this arrangement was not as efficacious as the former.

To make the application more effective by a retention of the applied temperature, a double layer of moistened gauze, about two inches square (indicated in illustration), is first placed over the affected eye and the water bag then put into position and retained in place if desired by means of tape or a string. Single or double bags are used, depending upon whether one or both eyes are affected. To retard the discharge of water and thus prolong the



duration of application, and also to produce a distention of the bag, a tiny opening is produced at the end of the discharging tube by inserting a bit of hard rubber tubing which contains a minute passage through which the water escapes. The arrangement is completed by placing two pitchers of like capacity at the proper height to produce a slow and steady flow of water from the upper to the lower vessel. When the upper one is nearly empty, it is only necessary to pinch the tubing or elevate the discharging end and pour the water from the lower into the upper pitcher to keep the apparatus running properly. The stream will flow from thirty to sixty minutes, depending upon the relative height of pitchers and size

of opening in discharging tube. By timing the process, the attendant may know exactly when to change the water, and the compress may be applied steadily and indefinitely without disturbing the eye or patient, which is very important, especially when the patient is sleeping and rest is essential.

If cold compresses are desired, chunks of ice are added to the water, and to retain the rubber tubing in the upper vessel a foot of glass tubing is inserted into the rubber one, which also prevents a collapse of tubing should the ice press upon it. If hot applications are indicated, heated water is used instead and kept at a uniform degree by occasional additions of hot water. In my experience, unless the pain demands a continuous application, the most satisfactory results are secured when the compress is employed intermittently, fifteen or thirty minutes elapsing between applications.

After the apparatus is properly arranged, which requires naught but what might be obtained in any ordinary home, it requires little or no attention and, in my opinion, is the most rational method of employing heat or cold in the treatment of acute inflammatory disorders of the eye, inasmuch as the temperature is uniform, the water bag is light and conforms to the surface beneath, the compress is applied directly to the area desired, the patient is not chilled or drenched by escaping water, and the application may be used indefinitely without disturbing the patient.

The apparatus is made by F. A. Hardy & Co., Chicago.

TRANSACTIONS

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VICE-PRESIDENT'S ADDRESS.

THE RELATION OF THE PATHOLOGIC CONDITIONS OF THE NOSE AND ACCESSORY SINUSES TO THE VISUAL APPARATUS.

J. A. STUCKY, M.D. LEXINGTON, K. Y.

Of recent years many rhinologists and oculists in Europe and America have devoted much time, energy and thought to the relation of the pathologic conditions of the nose and its accessory sinuses, to the visual apparatus. The subject is by no means unfamiliar, but the last word pertaining to symptomatology and diagnosis has not been said. For this reason, and also to show the intimate relationship that should exist between the two specialities, the subject has been chosen for your consideration at the beginning of this, the eleventh annual meeting of the American Academy of Ophthalmology and Oto-Laryngology.

The clinical signs of inflammation, suppuration, or obstruction of the accessory cavities of the nose and their influence on the eye, ear, nose and throat, and general health are frequently as varied and uncertain as the size, shape and position of these cavities.

Brawley,¹ in a recent paper, calls attention to some practically unrecognized pathologic conditions of the nose, the symptoms of which are purely ocular. The patient never has reason to suspect their nasal origin, and as the use of the eyes almost invariably increases the headache in these conditions, he consults an oculist for relief. Another reason for the belief that the patients have that the eyes are at fault is that correct glasses relieve for a time all or a greater part of the symptoms. This may be explained by the lessened congestion of the ciliary body resulting from a relief of the eye strain, however small in amount. As congestion is the basis of the nasal condition, even a slight reduction in its total amount will, for a time, give relief from the more prominent eye symptoms.

Emphasis is placed upon some of the more prominent points in the differential diagnosis between sinus and ocular headache. The former is usually unilateral, and if bilateral the pain is greater about one or the other eye. The accessory sinus pain or discomfort is more frequently intermittent, rarely constant and as bad in the

^{1.} Jour. A. M. A., June 5, 1906.

early morning as at night. It is not relieved by closing the eyes, is aggravated by bending the head downward, and is relieved by a free discharge from the nose or use of weak adrenalin and cocaine solution sprayed in the nose.

If the ethmoid sinus is at fault, the pain referred to as neuralgia, of a boring nature at the root of the nose, deep down between the eyes and radiating towards the side of the head. If the disease is active, there may be slight swelling of the upper eyelid and tenderness on pressure at the inner orbital angle or over the anterior wall and floor of the frontal sinus as compared with the opposite side. Vertigo or dizziness which accompanies the bending of the head downwards, as in stopping to pick up an article from the floor, is often very pronounced, and differs from ocular vertigo in that it is the same whether the eyes are closed or open, and is not noticed except when bending the head downward or jarring the body or any sudden or violent exercise.

The character of vertigo is with difficulty described, more frequently being spoken of as a "confused dazed feeling, caused by pressure in the head." The vertigo accompanying sphenoidal disease often approaches the cerebral type, while that accompanying disease of the other accessory cavities is similar to that found in other locations where pus is being formed in some cavity and absorbed into the circulation.

When this form of vertigo is very pronounced I have not always found evidence of suppuration, but more frequently a swollen boggy middle turbinate which blocks up the middle meatus so completely that the hiatus semilunaris and infundibulum were completely closed, thus interfering with the free aëration and the exit of the secretions from the frontal and anterior ethmoidal cells.

The etiology of both the vertigo and headache of nasal accessory sinus disease is explained by the "Anatomic relation of the middle turbinal to the hiatus semilunaris and the infundibulum. The air in the frontal and the anterior ethmoid cells is imprisoned by the pressure of the middle turbinal against the lateral nasal wall, the turgescent tissues filling in the hiatus semilunaris and effectually blocking it. The lining mucous membrane of the sinus absorbs the oxygen from the imprisoned air, and thus creates a rarefied condition of the air within the obstructed cells. This absorption results in a negative pressure and consequent swelling of the lining membrane and an increased blood supply to this region. Venous stasis, to a greater or less degree, results and may be shown by a swelling of the upper eyelid. Pressure of the congested tissues on the nerve endings, together with the stasis, produce the symptoms and results

in the reflex vaso-motor disturbances in the circulation of the neighboring structures. The essence of the whole matter is that there is interference with the interchange of air between the naval chambers and the accessory sinuses, and if pus or muco-pus is found, it indicates that infection has taken place from the nose." This or a similar view is advanced by Robertson,² Ewing and Sluder³ and seems most plausible.

Most perplexing to the rhinologist and oculist are those cases in which there is pronounced mixed naso-ocular defect, in which all the symptoms of the eye strain and sinus disease are present. I have had several cases of this kind, of which the following is a sample: Miss T., with hyperopic astigmatism in both eyes, requiring plus 2, combined with plus .25 axis 90°. This correction of refractive error gave marked relief for a short time, but the frontal headache, vertigo and lassitude continued. The turbinals were adherent to the lateral nasal wall and were removed—this was also followed by some relief, but it was of short duration. A radical frontal sinus operation was performed, pus and granulations were found in the frontal sinus, and the upper portion of the infundibulum was completely blocked. The anterior ethmoidal cells contained a mass of disintegrated tissue in which pus and granulations existed. The peculiar and perplexing features of this case were (1) the symptoms of ocular headache. The examinations of the eyes showed a marked error or refraction. (2) There was no reference by the patient to any nasal trouble whatever. The pain described being apparently due to the eye strain. (3) The correcting lens afforded much relief, but the pain persisted rather more over the right than the left eye. Bending of the head forward or jarring the body increased the pain and produced momentary vertigo. (4) The absence of subjective nasal symptoms, and examination showed nothing abnormal except the adherent turbinals. It was only after weeks of treatment and close observation that disease of the frontal and ethmoid sinus was diagnosed. This case was seen with me by Dr. D. T. Vail and J. W. Murphy and is cited to illustrate a not infrequent naso-ocular defect which is liable to lead us to overlook the concomitant nasal lesion where the ocular defect is pronounced.

Orbital abscess and optic atrophy due to spread of infection from the ethmoidal cells or bursting of an abscess originating in the frontal or maxillary sinus are not infrequently met with, and serious visual disturbances and infection of the delicate structures of the

^{2.} Journal A. M. A., March 5, 1906.

^{3.} Trans Amer. Oph. Soc., May 2, 1900.

eyeball are not surprising when we recall the intimate wascular and lymphatic relation existing between this organ and the nasal cavities. "Onodi has shown the relation of the optic nerve with the sphenoid bone and the posterior ethmoid cells, and in the majority of cases of active inflammatory conditions of these cavities the nerve is implicated. Indeed, if it were not for the double layer of periosteum which covers the bone forming the barrier between the nerve and the sinuses, and for the protection afforded by the nerve sheath, it would be difficult to comprehend how this nerve could escape involvement in affection of the sinuses, as the separating layer of bone is frequently as thin as paper and contains many dehiscences. The involvement of the optic nerve may vary in degree from a simple edema to an active retrobulbar inflammation."

Douglas* calls attention to a low grade of pachymeningitis frequently found in cases of suppurative ethmoiditis as follows: "In addition to head pain and ocular disturbances there may be other symptoms of a general character, such as fever, evidence of cerebral irritation and congestion, neurasthenia and gastric disturbances. The increased and irregular temperature is due to pus absorption. Gastric disturbances may be due to swallowing some of the fetid discharge of the sinus, and loss of appetite or a passive gastritis may result. Such cerebral symptoms as malaise, inability to concentrate the mind and actual depression, verging almost on melancholia are seen more frequently in the chronic cases. When cerebral symptoms arise in sinusitis they indicate the involvement of the meninges without perforation of the wall of the sinus, or. more usually, an actual perforation, in which latter event abscess of the brain rapidly follows. Abscess of the orbit occasionally gives rise to cerebral complications as meningitis, abscess of the brain and thrombosis of the cavernous sinus may follow.

I have seen one case of ophthalmoplegia externa in a case of suppuration of the frontal, ethmoidal and maxillary sinus, in which the radical operation of Killian gave complete relief of all symptoms. This case is similar to one reported by Holmes.⁵

I am convinced from my investigations that many cases of pareses and paralyses of the extra ocular muscles, supposed to be due to rheumatism or to syphilis, are caused by sphenoidal or ethmoidal disease, the muscles being involved, either by inflammation or pressure from pus formation, or perhaps to peripheral infection of the nerve filaments supplied to the muscle involved.

In nasal accessory disease the majority of the profession associate

^{4.} Nose and Throat Surgery (text-book).

^{5.} Ohio State Med. Jour., Feb., 1906.

with them the discharge of pus or muco-pus from the anterior or posterior nasal cavity. These are not the cases which give us the most concern or that cause most trouble, or are difficult to diagnose. It is in the cases without nasal symptoms or obstructive lesion or discharge of pus or muco-pus that we find the greatest difficulty in diagnosis. It is what is aptly termed as closed empyema which Douglas defines as follows: "The term closed empyema is applied to a cell or group of cells in which the discharge does not find an outlet, but is retained by a cyst within the cell, producing in time characteristic symptoms from pressure or deformities from enlargement of the cell. It is the closed empyema which perforate bordering cavities, such as the brain and orbit, and the closed empyemata are not limited to the ethmoid cells. They are often seen in the frontal and the aphenoidal sinuses, but rarely in the antrum."

Not only are we misled by the absence of external evidence of pus formation in these cavities, but we frequently meet with cases in which there is pressure between the turbinals and the septum which give all the symptoms of sinusitis when in fact pus is not present. The removal of the pressure alone gives relief.

I know of no diagnosis more difficult to make than that of closed empyema of nasal accessory sinuses. With all our care in weighing the objective and subjective symptoms together, with the careful use of trans-illumination and the X-ray our conclusions are often arrived at by exclusion and intuition.

In the study of the region now under consideration there is still "much timber, tall and uncut"—much anatomical and physiological work to do, and a still greater field for study in the pathological realm. Laurels and gratitude await the patient and persevering investigations of our members as to the etiology, diagnosis and treatment of diseases of the nasal accessory cavities. Medical journals and text-books are full of the results of the investigations of our ablest men and from these, every step to be taken to arrive at a correct diagnosis can be learned. The ocular symptoms common to or produced by affections of the nose and accessory cavities are due to either an acute or chronic condition and are amenable to either local systemic or surgical treatment; often all being required to give the desired relief. I have little regard for the long continuance of local treatment-it rarely does more that palliate the symptoms and delays the inevitable thorough systematic overhauling, or removal of the pressure and release of contained secretions, pus and granulaitons by surgical intervention. The part played by the lithemic expressions in the naso-pharynx, in the production of disease of the

nasal accessory cavities, is an important one, especially in the acute form⁶ and should be carefully looked after.

In the acute stage of the infection the indications for treatment are entirely antiphlogistic, the chief indications being, first, to relieve suffering and discomfort; second, to prevent suppuration. The patient should be put to bed, the room kept quiet, and bright light excluded as long as the eyes are sensitive. Arouse the secretions with full doses of calomel (5 to 10 grains) combined with a small quantity of ipecac. This should be followed in six or eight hours by a saline cathartic. Sodium salicylate and sodium bromide, 10 grs. each, pilocarpin gr. 1/10 to 1/20 in four ounces of water every two or four hours till pain is relieved and diaphoresis is established. The activity of the skin should be maintained by frequent bathing, great care being used not to chill the patient when giving the bath. Dry heat should be applied to the frontal and occipital regions by the use of hot-water bags. Locally, a nasal douche of hot normal saline solution applied both anteriorly and posteriorly, or Seiler's solution in one-half strength, should be used twice daily. This not only keeps the passages clean, but is very soothing and grateful to the sufferer.

If the nasal passages are occluded or uncomfortably "stuffy" a small quantity of the following sprayed into the nostrils every two to four hours is most effective and rapid in its action: Sodium chloride, grs. 5, resorcin, grs. 5, adrenalin solution (1 to 1,000), dr. 1, aqua, drs. 7.

This strength of adrenalin is all that is necessary, practically no reaction following its use. Cocaine and opiates are mentioned only to be condemned, because of their unpleasant reaction and having a tendency to thwart the objects aimed at in the treatmnet. Only in exceptional cases have I found their use advantageous.

Special care should be given to the systemic condition, the secretory functions being maintained in an active state. On account of the great susceptibility to recurrent attacks, convalescence should be guarded and the patient kept indoors until thoroughly restored.

Acute catarrhal sinusitis, whether involving the ethmoid frontal, maxillary, or sphenoidal cells, usually subsides spontaneously under appropriate antiphlogistic treatment. When suppuration occurs the imprisoned pus must be evacuated and thorough drainage maintained or serious results may follow.

The following conclusions⁷ given by me in a recent paper on this subject, embodying the results of my observations for the past fifteen

^{6. &}quot;Acute Sinusites," Jour. A. M. A., Feb. 21, 1903: "Lithemic Naso-Pharyngitis, Oct. 14, 1904.

^{7.} Cincinnati Lancet-Clinic, Dec. 17, 1904.

years, are still held to be conclusive of the fact that not enough attention has been given the treatment of the acute form of nasal accessory suppuration, and that the importance of its early recognition is not fully appreciated. The suppurative process may exist in a latent form, giving rise to no marked local symptoms, and eventually resulting in ocular or systemic infection.

Chronic inflammation in a closed cavity has a tendency to pus formation, especially in the nasal accessory sinuses. While I have never met with a fatal case, such an issue undoubtedly occasionally occurs from absorption of pus or the invasion of suppurative inflammation through the optic foramen or holes in the cribriform plate. The more common sequels of chronic suppuration of the accessory sinuses are manifested by a low and persistent toxemia or some form of neurasthenia and migraine.

The treatment is the same as for pus formation in any other part of the body—that is, free drainage and the removal of the morbid material. The middle turbinal body most frequently causes obstruction of the natural openings and thus interferes with free drainage, and its early removal decreases the necessity for more extensive and radical operation later. The radical operation of opening the sinus externally is not advised unless there is evidence present of carious bone and granulation tissue which cannot be removed intra-nasally.

In this day of specialism there is a danger of our becoming cyclopic with only one eye, that sees only the oto-rhinological part of the body, overlooking the possibility of danger that may result to the ocular apparatus to which it is so intimately related.

Each case is a law unto itself, and as stated before, the symptoms often vary as much as do the size, shape and position of the sinuses. For these reasons the oculist and rhinologist, instead of drifting apart, should work closer together.

ORATION.

PRACTICAL PROBLEMS IN OTOLOGY AND RHINOLOGY.

DUNDAS GRANT, M.A., M.D., F.R.C.S.

LONDON, ENGLAND.

Mr. President and Gentlemen:

I should be proud to place before you a piece of original investigation containing some epochal addition to the sum of human knowledge, or at least of that section of it with which we are particularly occupied. Such, however, I am unable to do, as, from circumstances, and perhaps from temperament, I have been led to enroll myself as a simple healer of the sick. My inquiries have always been conducted in the light of practical pursuits, and if there is one thing on which I think I may congratulate myself more than another, it is the possession of a frame of mind which enables me to extract the greatest amount of benefit (duly acknowledged) from the work of others, instead of racking my brains to find means of criticising and depreciating it. How often have I seen the critical frame of mind deprive its possessor of much of the good he might otherwise have derived.

My initiation into otology dates from thirty years ago, when my valued friend and relative, Mr. Laidlaw Purves, indoctrinated me in the practice and principles of the specialty and inspired in me an interest in this branch of the medical art which I venture to think I still retain and hope never to lose. As the successor to Hinton in the great school of Guy's Hospital, he maintained the best traditions of British Otology as established by Toynbee, enhanced by a familiarity with the advances in the art as developed and practised in Continental schools, notably in Vienna, where Grüber and Politzer were the chief exponents. Grüber is now no more, but Politzer, in spite of the length of his active career, is still as receptive and appreciative of new ideas as ever and bids fair to continue long an example of industry and enthusiasm which we may well emulate and strive to imitate.

At that time the ear was mainly studied in relation to its main function, that of hearing, and the surgical developments of otology, with which we are now so familiar, were scarcely dreamt of. I cannot help thinking that the progress in this direction has dazzled the otological eye by its brilliancy and diverted from the less sensational problems of what I may call acoustic otology, the attention they have deserved. It cannot be said that in this department the progress has been at all in proportion to that in the surgical.

Far be it from me, however, to say that we have remained at the stage where cases which failed to respond to the syringe or to the air-douche were considered hopeless, but the advance beyond it has not been so considerable as could be wished.

THE VALUE OF TUNING-FORK TESTS.

At the commencement of the period I have mentioned the functional examination of the ear was by no means neglected. Tuningfork tests were studied by Lucae, Schwabach and other otologists, and Hartmann devised his well-known conventional graphic representations, but I think it will be generally agreed that the fullest development was only attained by the laborious investigations of Professor Bezold of Munich, for the results of which he is entitled to our warmest gratitude. Ostmann and Gradenigo have been among the other most diligent developers of this method of testing, at a great expense of time and labor. Possibly there has been a tendency to overestimate the value of these tests, especially when we consider their subjective nature and the "personal equation" of such untrained observers as the patients on whose statements we have to depend. On the other hand, it is surprising to read the statement by the surgeon in charge of the aural department of a metropolitan medical school that he has quite given up tuning-fork tests. Jacobson, late of Berlin, now, unfortunately, deceased, has certainly exposed them to the most destructive criticism, but has in the description of his practice shown himself unable to dispense with them. As usual, the truth lies in the middle, and we must realize the limitations of the tuning-fork tests, not reject them. Care must be taken both in observation and interpretation.

In the first instance we must only accept results which are well marked. Bing suggests that no difference of less than two seconds from normal duration should receive consideration. This applies especially to the measurement of hearing by bone-conduction. Again, it is well to repeat the tests several times, exercising considerable skepticism if they vary to any great extent.

Forks of very high or very low pitch are ill adapted for tests connected with bone-conduction. Very high-pitched forks are apt to be heard by the opposite ear by air-conduction, in spite of our closing it up, thus rendering the testing of the ear under investigation very unreliable. For Weber's vertex test they are, therefore, ineligible. Low pitched forks are of such weight and magnitude that

the patient may feel the mechanical vibrations after he ceases to hear the sonorous ones and thereby be led into error in reporting. The ideal fork for bone-conduction in general and especially for such tests as Rinne's and Weber's is Gardiner Browne's, tuned to c, with 256 vibrations per second. It should be heard by a young adult for about 15 seconds through the bone and for about a further 15 opposite the meatus. This "aero-osseal difference" is an important item which should not be omitted in the description of a tuning-fork. The duration should be long enough to allow of a good margin for observation and it should not be so long as to induce phenomena of exhaustion in a normal person.

Having been born in the year in which Rinne's test saw the light (the one in which Garcia invented his laryngoscope), I take the test somewhat to heart. I consider its evidence, especially when "positive," as indispensable, but would remind you of an obvious fallacy into which I and many others have been led by it and which in many text-books receives no notice. This is that in unilateral nerve-deafness we get a "negative Rinne" because we are comparing the airconduction of the diseased side with the bone-conduction of the sound one, the vibrations of the tuning-fork on the mastoid being conveyed through the cranial bones to the opposite ear. Here we have to check our results by means of the vertex test and the Galton whistle in a way I need not here recount.

I think I have said enough to show that the results of our tuningfork tests must not be blindly accepted, but must be interpreted in the light of their limitations. Moreover, we must take them in combination with other signs. We must not rely on them alone any more than we would rely on any other single method of examination of any organ of the body.

For the production of pure tones we have no more convenient instrument than the tuning fork, and in some form or other the graphic method of recording the field of audition, for which we are primarily indebted to Hartmann, will never be dismissed from employment even though submitted to modification in some directions. Probably it will advisably be confined to air-conduction, and the number of octaves may, by the use of nine instead of five tuning-forks, be increased to eight with advantage. The amount of time required may be considered sufficient to render it impracticable for general use, but this pales into insignificance beside Professor Bezold's monumental "continuierliche Tonreihe." I may remind you that to facilitate calculation and to save time I have devised and described a method by which the percentage duration of hearing for nine forks can be taken for both ears in less than twenty minutes,

not merely by an aurist, but by any assistant possessed of normal hearing and conscientiousness.1

To convert this percentage of duration of hearing into percentage of actual hearing power is a problem which is certainly of great interest and probably of great practical value. Undoubtedly as a step in the direction of scientific righteousness it merits our careful attention. In the mere testing with the watch or the voice we ought, if we are to be accurate in our measurement of the patient's acuity of hearing, to allow for the fact that sound diminishes as the square of the distance. To grasp and apply this comparatively simple rule would disconcert many of us; how much greater is the difficulty in calculating the percentages of hearing by the tuning-fork when we remember that the tone dies away by logarithmic decrements with a factor peculiar to each individual tuning-fork. Bezold, by adopting a rule of Edelmann's assuming that the decrement of all tuningforks was the same, calculated out a very near approximation to the desired result. Schmiegelow adopted the method of measuring the distance at which the fork under investigation was heard at the end of the different periods of duration. Ostmann's method is in a way an extension of Gradenigo's, being founded on the principle that the visible and calculable amplitude of vibration is an index of the intensity of the sound. Gradenigo makes them exactly proportional, but in reality the intensity varies as the square of the amplitude. My friend, Dr. Womack, investigated for me the set of forks I use, employing the microscopical method for finding the constant factor peculiar to each of the lower forks and the distance method for the higher ones. He has prepared for me charts which show for the nine forks the relation borne by the percentage duration to the percentage auditory acuity. It will be seen that the divergence is greatest at the middle of the duration, 50 per cent. of duration in case of a tuning-fork of medium pitch being equivalent to only about 15 per cent. of normal auditory power.

How far this correction of the charts with which we have so long been familiar will lead us to greater accuracy in diagnosis is quite uncertain, and for the present Hartmann's claim to our gratitude is certainly indisputable.

DIAGNOSTIC VALUE OF TESTS FOR HIGHEST PITCHED TONES.

It is pretty generally accepted that loss of hearing for the highest pitched tones is characteristic of and, indeed, almost pathognomonic of disease of the labyrinth, we may almost say of the lowest turn of the cochlea. The tympanic apparatus is mainly required for the

^{1.} Brit. Med. Jour., Oct. 22, 1898, vol. ii, p. 1239, and Laryngoscope, February, 1898.

conduction of the comparatively slow vibrations of the lower pitched tones, and in spite of it being diseased or at least fixed, the highest pitched tones are heard. If, with evidence of disease of the conducting apparatus, the hearing for the highest pitched tones is defective or lost, we assume that there is simultaneous labyrinthine disease.

If our tests exclude disease of the conducting apparatus any deafness present must be attributed to disease of the auditory nerve in its labyrinthine expansion, its trunk, its cortical center or the fibers of communication between the nerve and this center. If the deafness is, under these circumstances, most marked for the highest tones, the affection is most probably situated in the cochlea. Should, however, the defect of hearing be equally or more pronounced for deep tones, the portion of the auditory nervous apparatus is more probably some part other than the labyrinth, possibly the cortical centre.

What is the foundation for this view?

Gradenigo,² in Schwartze's handbook, asserts it as well established by his experiments and observations, and Politzer³ quotes Gradenigo directly. The typical defect for high tones is shown in most of our charts of hereditary syphilitic disease known usually to affect the labyrinth. On the other hand, in Siebenmann's⁴ case of central disturbance of hearing depending upon a lesion of the crural tegumentum, the perception of the lower tones was the first affected, later the perception of all tones being equally diminished. In Gradenigo's⁵ cases of lesion of the auditory nerve-trunk, the tones in the middle of the range were the worst heard.

I have ventured to lean on these results and to assume as a practical rule that in cases of nerve-deafness in which the defect is not most pronounced for the highest pitched tones, but for all tones in pretty equal proportion and perhaps even more for the lower tones, the affection is probably one of the auditory center rather than the labyrinth or nerve-trunk. If, further, there is no evidence of an organic lesion of the other cranial nerves or central nervous system, there is a reasonable probability that the affection is a functional one and the prognosis is *ceteris paribus* more favorable. I have applied this principle in numerous instances, as in neo-marital and tobacco forms of nerve-deafness. Two most striking cases, one of hysterical deafness, and one of neurasthenic dulness of hearing, I

^{2.} Handbuch der Ohrenheilkunde, vol. ii, p. 394.

^{3.} Lehrbuch, 1901, p. 588.

^{4.} Arch. of Otology, vol. xxvi, p. 346.

^{5.} Schwartze's Handbuch, vol. ii, p. 513.

published in the *Journal of Laryngology*. In the former⁶ the hearing, which suddenly returned, had been so genuinely extinguished that the patient spontaneously acquired the art of lip-reading. In the latter⁷ a little more generosity in diet, stimulants and rest and greater economy of labor and of conscientiousness resulted in recovery.

In regard to lengthened bone-conduction may I state a conviction that this is produced by increased tension in the conducting apparatus, not by simple obstruction, as I have found it practically absent in cases of uncomplicated ceruminal occlusion?

We will all admit, no doubt, that in combinations of affections of the nervous and conducting apparatus the shortening of bone-conduction due to the former may neutralize the lengthening due to the latter. The degree of loss of air-conduction and the alteration of the aero-osseal difference (negative Rinne) may here enable us to check results. As a rough rule I think that in pure "obstructive" deafness the amount of loss of A.C. should be about equal to that of the increase in B.C.

THE ACTION OF QUININE ON THE AUDITORY NERVE.

The more the nature of the changes produced by quinine in the internal ear is investigated, whether from experimental or clinical research, the more complicated the question becomes. Kirchner's somewhat crude experiments seemed to have proved that there was a congestion with effusion of blood in various portions of the labyrinth. It was later elicited that in each case the animal's death was accompanied by convulsions, and it was shown by Gruner that in animals killed in such a way as to produce convulsions, but without any administration of quinine, similar disturbances were produced in the labyrinth, though possibly in a less degree.

Wittmaack's experiments showed that changes were brought about in the auditory cells and in the auditory nerve of such a nature that Nissl's bodies disappeared, a phenomenon seen in degeneration of other parts of the nervous system. This very objective observation left unanswered the question as to whether congestion or anæmia was produced.

In favor of the anæmia theory was the analogy with the quinine amblyopia cited by Brunner. This is accompanied by an unmistakable anæmia of the retina and the citer argued by analogy that the same condition must be present in the labyrinth. It cannot be said that his contention has been altogether disproved, and some highly competent observers (I may mention among them Dr. Milli-

^{6.} Jour. of Lar.

^{7.} Jour. of Lar., May 1902.

gan of Manchester) are of the same way of thinking. The majority are, however, apparently inclined to believe in the existence of a congestive condition. Rossa reports the actual occurrence of visible congestion of the tympanic membrane as the result of the administration of quinine. Blake warns against its administration in cases of inflammatory congestion of the ear (though it must be admitted that the ultra-conservative or anti-paracentesis school headed by Zaufal and Piffl give salicyclate of soda with a view of cutting short an acute otitis media). Numerous writers accept without question the view that these drugs cause congestion of the labyrinth, and I myself am of this opinion, as the result of inference from general clinical observation and also from finding the tinnitus produced by quinine quieted by compression of the vertebral arteries. This has the effect of diminishing the blood-pressure in the basilar artery, its branches, the internal auditories, and, thereby, in the vessels of the labyrinth.8 I may remind you that this compression may be made in the suboccipital region, the thumb and finger of one hand being placed in the hollows behind the mastoid processes while counter-pressure is exercised by means of the other hand placed on the forehead. As the arteries lie under the complexus muscle the pressure has to be rather firm. If such pressure checks pulsating noises or vertiginous feeling, the inference is that these are due to congestion in regions supplied by the branches of the basilar artery, probably the internal ear.

QUININE IN AURAL VERTIGO.

Allied to the question of the effect of quinine on the hearing-power is its mode of action in cases of aural vertigo. In regard to this it is hardly too much to describe it as specific. One might almost borrow a term from the homeopathist and call it dynamic. I need not recall to you the history of the matter. It was first supposed that enough had to be given to destroy the functions of the entire internal ear, the vertigo ceasing as soon as the auditory power was extinguished. Needless to say, one hesitated to adopt such a drastic measure, and quinine did not take in the routine treatment of aural vertigo the place which it deserved. With some it is more habitual to treat "Meniere's disease" with bromide and iodid of potassium. I made an attempt to distinguish "congestive" from "anæmic" forms, giving bromides in the former and quinine in the latter, but found that so far as the vertigo was concerned, quinine was efficacious in both. As regards the dosage, I found large quantities quite unnecessary, and one grain or even the half or the quarter of a grain (with or without ten to fifteen minims of dilute hydrobromic

^{8.} Brit. Med. Jour., Dec. 24, 1887.

acid) was ample. In fact, I ventured the opinion that quinine acted in regard to vertigo neither by causing congestion nor anæmia, but by exercising a direct sedative effect on the vestibular nerve. The recent experiments of Dreyfuss have confirmed this view and established it on a scientific basis. These experiments were carried out on guinea-pigs by means of the rotating table, and he found out the peculiar attitude adopted by the animal when the rotation reached a certain minimum degree of rapidity. When he rotated animals which had been dosed with quinine he found that a very much higher degree of rapidity was required in order to induce the adoption of this attitude, the sense of disturbance being obviously dulled by the drug. It seems to me that these results should give us the greatest confidence in the employment of this remedy in aural vertigo, remembering, however, that many other contributory factors in treatment are of undoubted importance. Among others we may note the value of a few days' rest in bed, the treatment of the alimentary system, the kidneys, etc.

In cases in which the diagnosis between aural and epileptic vertigo present difficulties, which Dr. Risien Russell so well described in a discussion by the Othological Society of the United Kingdom, I believe we have in quinine a test well worthy of consideration.

A rough rule in regard to the action of drugs in some important types of vertigo is that aural vertigo is benefited by quinine, epileptic by bromides, renal by iodides and traumatic by small doses of perchloride of mercury. I am assuming for the moment that there is no obvious aural lesion (polypus, cholesteatoma, etc.) which the practical otologist would not overlook, nor the ocular, cerebral, spinal or migrainous disorders which he ought to keep in mind.

SOME USES OF INSPIRATORY EFFORTS IN NASAL AND LARYNGEAL THERAPEUTICS.

In a paper by Klebs, read before the German Otological Society, attention was drawn to an observation of Hunter regarding a point in the physiology of the respiratory and vascular system, which seems to me of great importance to the rhinologist. It is to the effect that during vigorous inspiration the expansion of the chest must mechanically induce a certain amount of dilatation of the cavities of the heart and great vessels. In suction of blood is thus produced and this must ceteris paribus lead to a diminution of the blood pressure in the peripheral vessels and among others those of the upper respiratory passages. The direction of suction favors the formation of coagulation plugs in vessels which may have been opened, as by operations in the nose.

Patients are, therefore, recommended to avoid snorting out, but, on the contrary, to snuff vigorously up through the nose and spit out by the mouth any blood which has been drawn into the back of the throat. I have thus found the hemorrhage after operations for adenoids, for instance, diminished to an extraordinary degree if these instructions are carefully followed. I may incidentally offer as an argument in favor of the short anesthesia for these operations that the patient is all the sooner able to perform these voluntary movements.

Another application of inspiratory effort is its use in the emptying of accessory nasal sinuses. Mott of Arnheim recommended in cases of acute catarrh of the frontal sinuses that the patient should pinch his nostrils and then draw a full breath, thus exercising suction more or less on all the sinuses, but as a rule chiefly on the frontal, as having the most dependent opening. By changes in posture the various cavities may be put into favorable position as, for instance, the sphenoidal by bending the head downwards and forwards, as I have several times observed.

For the purpose of suction of the nasal sinuses the mechanical arrangement devised by Sondermann is very recommendable. It consists of a nose-piece like an anesthetist's face-piece in miniature provided with pneumatic india rubber cushions round its margins so as to fit air-tight. To the front of it is attached a tube and air-ball with valves so arranged as only to allow of exhaustion. The ball is compressed and only allowed to expand when the patient raises the soft palate by the utterance of the sound "ee" or "kee." With a little practice the knack is easily acquired and very marked suction effected. I have observed this in both the frontal and sphenoidal sinuses. The relief afforded in a chronic frontal catarrh in the person of the wife of a Canadian medical friend was most striking.

Again for the irrigation of the nose I think I have utilized the process of inspiration to great advantage. A small glass vase has a cork with two tubes, one going down to the bottom of the vessel, the other only through the cork. The former has a bulbous orifice at its outer extremity to fit the patient's nose; the other is cut quite short. If the patient snuffs vigorously through the tube the liquid from the bottom is drawn up through the nose and back into the throat where it can be spat out. It will be remembered that when the air is snuffed up the nose it runs up towards the roof before going backwards, and the same direction seems to be followed in some degree by the fluid, as I have often seen the middle meatus thoroughly cleansed by this method. It has another advantage,

namely that the vis a fronte draws it past the Eustachian tubes, so that the risk of infection of the middle ear is reduced to a minimum. The instrument reduced to its simplest form consists of a short tube with a bulbous orifice.

Inspiration may be practiced for the benefit of the larynx, and those who have not introduced Leduc's tube for the inhalation of powders into the larynx into their practice, would do well to give it favorable consideration. It consists of a glass tube of about 10 inches in length, one end of which is pushed to the back of the patient's throat while the other is placed in a small saucer containing the powder to be inhaled. The end in the throat is curved downwards for about half an inch through an angle of 100°. The opposite end is bent down for 3 inches so as to dip conveniently in the powder. The lips are compressed firmly round the tube and if a sharp sucking inspiration is made, a quantity of powder is drawn into the larynx. This can be done by the patient, who thus has placed in his hands the means of anesthetising a tuberculous larynx and of rendering the swallowing of nourishment possible in cases in which it would otherwise not have been so.

Among the most useful powders are: Di-iodoform as an antiseptic. Orthoform as a local anesthetic in ulceration. Anesthesin similarly a local anesthetic and antiseptic. It is useful also when there is no ulceration and tends to reduce edema. Its anesthetic action is in my experience shorter than that of orthoform. A combination of two parts of orthoform with one of resorcin acts as an excellent anesthetic and antiseptic.

There is no doubt that in persons with weak and dilatable hearts the inspiratory efforts I have described should only be practiced with the greatest discretion and in some cases should be avoided altogether. Incidentally I can not help thinking that the violent inspirations through the nose, which are such a feature of some courses of physical instruction, may lead to cardiac dilatation, more especially in the presence of nasal or naso-pharyngeal obstruction.

THE VALUE OF INTRANASAL TREATMENT IN SPASMODIC ASTHMA.

Considerable divergences of opinion have been expressed with regard to the influence of intranasal disease in the production of spasmodic asthma. My views were stated in my address as president of the Hunterian Society of London in 1900. I then expressed myself to the effect that asthma is a disease in the treatment of which general medicine owes much to the specialist, and every practitioner in diseases of the nose must have before his mind cases in which the treatment of the nasal cavity has resulted in long and even permanent relief from the suffering depending upon this dis-

ease. I went on to say that, at the present time, physicians make a rational search for nasal symptoms and when such are present or suspected, then only are the patients brought before the notice of the rhinologist. and under such circumstances the percentage of beneficial results is by no means a contemptible one.

It would indeed be strange if the important experimental proofs of the interaction between the nerves of the nasal mucous membrane and those of the bronchial muscle, brought forward by Brodie and Dixon, were not confirmed by clinical experience. No doubt the exaggerated hopes raised by Hack and his followers, and the untural disappointments that ensued, were calculated to bring the nasal theory and the practice founded on it into discredit. The harm done thereby was small, however, compared with the result of leaving the nasal condition alone. I remember well the case of a medical man who, on account of asthma, had been obliged to give up his practice near London and retire, at great loss, to a town on the South Coast. He had acted on the advice of a physician who, he states, had actually not even examined his nose. At a later period, too late for the mischief done to be repaired, I found his nose packed with polypi which must have been already present, though no doubt in a lesser degree, when the asthma had established itself. Mr. Mayo Collier narrates another case in which the same spirit of skepticism had prevailed. On the other hand, all must have seen, as I have done, occasional cure and frequent relief following the removal of nasal sources of irritation. As illustrating the effect of nasal treatment I may say that I have observed at least two cases in which the attacks were checked by a nasal spray of mucin as devised by Mr. Stuart-Low. The immense vogue obtained by the advertised nasal spray "cures," which appear to contain chiefly cocaine, adrenalin and atropin, shows how beneficial nasal treatment can be. The results obtained by Francis by cauterization of the septum, however explainable, offer strong confirmation of the value of the intranasal treatment.

In order to check my impression by the results of cases, I wrote some years ago to eleven patients and found that three of them were cured, three much improved, four relieved for a time and one not relieved at the time but cured subsequently. These were a few consecutive and unselected cases, and did not include others before and after, among which I could easily quote some of my most satisfactory results. This is very much what one would have expected and I think it sufficient to justify comparatively moderate views. In reality it probably makes the case for nasal treatment less favorable than it ought to be, because among the failures there

were certainly some who did not give the treatment a fair trial. One, for instance, was an alien lady who, for reasons of economy, chose to be treated in the hospital, but being quite unsuitable for charitable treatment, withdrew herself from the institution and from my care, to the detriment of the result. In another instance the irritation caused by the operation induced a temporary aggravation of the asthma (a clear proof of the causal nexus), and the recovery which followed took place in other hands and was attributed, I am informed, to the administration of small doses of arsenic. Again, from one cause or another, intranasal operations are sometimes, as such, unsuccessful in my hands, though possibly other and more skillful or less experienced nasal surgeons can boast of having no disappointments. I can not.

SCLEROSIS OF THE MIDDLE EAR.

One of the most distressing problems is the nature, cause and, if possible, the cure of those insidious progressive and incurable forms of deafness without visible change in the tympanic membrane and without narrowing of the Eustachian tube. I need hardly say that I refer to what is now known as sclerosis of the middle ear, otosclerosis, ankylosis of the stapes, chronic labyrinthine capsulitis.

It has taken long for this condition to have its proper place in our otological nosology, many of the cases formerly described as nerve-deafness being doubtless examples of this disease, and many cases described as sclerosis being really chronic tympano-Eustachian catarrhs. The introduction of methodical tuning-fork tests corrected the former error to a considerable extent, the latter one being apparently still current, if we may judge by the descriptions of stenosis of the Eustachian tube and thickenings of the tympanic membrane in the accounts of cases put forward as instances of sclerosis. There may no doubt have been in these cases an ankylosis of the stapes, but in any event they were certainly not cases of pure sclerosis as we now understand. In Professor Politzer's second last edition of his great text-book, cases of sclerosis were included in the account of chronic catarrhal adhesive processes, although among the drawings of his pathological sections were beautiful specimens of the disease in question. In his latest edition (1901) it need scarcely be said that the condition receives ample individualisation and is most clearly named and described. Panse, Stern, Katz, Siebenmann and others have added important contributions to our knowledge and Denker's monograph9 gives a complete study of all the original work on the subject. Recently it was discussed by the Otological Society of the United Kingdom, Dr. Albert Grav¹⁰ adducing

^{9.} Die Otosclerose, Wiesbaden, 1904. 10. Proceedings of Otological Society of the United Kingdom.

reasons for thinking that the osteitis and osteoporosis, now recognized as the main morbid anatomical condition, was attributable to a slowing or feebleness of the circulation. This view was corroborated by my own and others' observations of its occurrence in young anæmic women and also by the familiar fact of its frequent inception after child-birth. What its exact pathogenesis may be seems still obscure and of course the postmortem examinations are few in number and do not afford much guide as to the early stages. It is interesting to note the observations of Ducrest¹¹ and Moreau¹² to which Professor Kolisko first drew my attention. They found small osteophytic plates on the inner surface of the skulls of women who had died in child-bed, though it must be admitted this suggests nothing more definite than a tendency to osteoid changes in association with parturition. The part played by parturition in exciting osteo-malacia is perhaps also suggestive, though it can not be said that the osteo-porosis of otosclerosis presents much in common with the limelessness of the bones in the other disease. Possibly more numerous sections may throw greater light on this obscure matter. I think it probable that it will be found to arise from various causes. Among others I am disposed to give a prominent place to that strange disease, chronic osteo-arthritis deformans. In many of my cases of sclerosis I have found evidence of actual arthritis or of its early symptoms, with frequently a history of its existence in the family, especially in the mother. Again, in the examination of some cases of osteo-arthritis, I have found, with even quite slight disturbance of hearing, a negative Rinne, but without indrawing of the membrane, narrowing of the Eustachian tube or improvement on inflation. In such cases the remedy most likely to be beneficial is the carbonate of guiacol.

Siebenmann has initiated a plan of treatment by means of phosphorus and anything advanced with the weight of his opinion deserves our very highest consideration. I confess, however, a difficulty in following the arguments in favor of this recommendation. It is founded on the observations originally made by Wegner and confirmed by Miwa¹³ and Stoetsner, that in young animals the administration of phosphorus modifies the bones in such a way that where spongy tissue should be formed in the growing bone, dense solid tissue takes its place, which, examined by the naked eye and microscope, is found to consist of well-formed bone.

^{11.} Recherches sur une Production O sceuse â la Surface du crâne chez les femmes Mortes on Couches" ("Mém. de la Soc. méd. d'Obsen, Paris, 1844).

12. "Osteophytes Crâniens," Bull. Soc. Anat. de Paris, 1844.

^{13.} Jahrbuch f. Kinderheilkunde, vol. xlvlii, p. 173.

With these results before us, I fail to see a priori the advisability of administering a drug whose action seems to be to cause solidification of spongy bone, thereby rendering it all the more dense. Possibly there is some flaw in my reasoning and I am most open to conviction if I am in error. However, Professor Siebenmann¹⁴ says that in about 50 per cent. of the cases treated with phosphorus the result as regards "cessation of falling off of hearing-power" was very satisfactory. These statements may be accepted as unquestionable, but we are free to consider whether the cessation was a result or simply a coincidence.

This brings us to the very important question of prognosis, in regard to which all who have had much experience know the necessity of caution. We were formerly led to believe that these cases went of necessity from bad to worse till the patients became "stone-deaf," and we accordingly told them so and said we could do nothing for them. I can not say there is very much more we can do for them, but we have seen so many cases who years later were no worse and, if anything, a little better, that we are justified in most instances in reassuring them that there is, at all events, no certainty of their getting entirely deaf or even worse than they are beyond the natural changes incident to advancing age. In short, although we can not offer any hopes of recovery, we need not give a prognosis of despair.

As to the influence of child-birth in originating or increasing otosclerosis, there can be no doubt, but whether we are justified in
prohibiting marriage or in inducing the extrusion of the fertilized
ovum in the subjects of this disease, is a very anxious question.
Marriage is not always followed by child-birth, and child-birth is
not always followed by increase of oto-sclerotic deafness, so that
on the whole, in view of the uncertainties of result on the one hand
and the sociological advantages of wedlock on the other, we are only
justified in giving warning as to possibilities, not in uttering a
prohibitive prognosis. One of my earliest patients with sclerosis
of considerable severity eventually married, and instead of getting
worse as the result of two child-births, got, on the contrary, rather
better. If marriage in any given case is likely to bring increase of
happiness and comfort and to lead to the realization of legitimate
aspirations, the result is calculated to be beneficial.

Some years ago I tried the effect of vibration applied to the spine by means of a small electric motor on the spindle of which was attached eccentrically a disc of metal so as to impart a jarring movement during its rotation. This was intended to supply such

^{14.} Verhandl. der Deutsch. otolog. Gesells. Wiesbaden, 1903.

mechanical vibration as is experienced in a railway train or omnibus which, as is well known, produces for the time improvement in the hearing, which is attributed to the noise rather than the vibration. The best situation is the lower cervical region and the vibration seems to be communicated to the ossicles with less risk of exhausting the auditory nerve than when noisy acoustic vibrators are applied to the ear. The treatment was applied for about five minutes at a time once or twice daily or at longer intervals until the patient, if improved at all, attained the maximum amount of improvement. I reported ten consecutive cases, in two of which very considerable improvement had taken place, in others a variable degree and in some cases none at all. The cases were of the typical sclerotic type and unrelieved by treatment carried out through the Eustachian tube. From time to time I meet a case in which this treatment affords some relief.

DOES NASAL OBSTRUCTION CAUSE OR KEEP UP CATARRHAL CONDITIONS OF THE MIDDLE EAR?

A question in regard to which a good deal of controversy has taken place is whether nasal obstruction, as such, can cause or keep up catarrhal conditions of the middle ear. The practical question was as to the utility or even the justifiability of operations for the removal of nasal obstructions on account of the persistence of aural catarrh in general obstructive deafness.

That the influence of such obstruction has been immensely overrated, I am perfectly convinced, but that in a certain proportion of cases it has a direct influence, I am equally certain. Naturally it is difficult to appraise its value in a large number of cases because the patients complain of the deafness and we adopt other methods of treatment over and above the removal of nasal obstruction. It is, therefore, only in rare cases, such as one in which I removed a septal obstruction on account of mouth-breathing and pharyngitis in a singer who made no complaint of dulness of hearing but who afterwards stated that the ear on the same side as the obstruction, which had been his "deaf ear," ceased to be deaf when the obstruction was removed.

I think it will be admitted that if the changes in the middle ear are such as may be produced by non-ventilation of the tympanum, nasal obstruction may be included as a particeps criminis, and its removal may be considered as indispensible or at all events justifiable.

The best available evidence that non-ventilation is a causal factor in the aural disturbance is the occurrence of improvement in the hearing after inflation. This view was indicated by Dr. MacBride in a letter on the subject to the British Medical Journal15 and it is one with which I venture to think most of us will agree, as also with the converse that in cases in which no improvement follows, and especially if there is at the same time free entrance of air on inflation, the ear is not at all likely to be benefited by the removal of a nasal obstruction.

Perhaps it might be stated that in cases of pure nerve-deafness, · nasal operation is all the more contra-indicated (the shock and hemorrhage in nervous or anemic patients may be highly injurious). Here is a rule which seems absolute, but I can quote a case in which the removal of adenoids led to the complete recovery of hearing in the daughter of a medical friend, whose nerve-tone and general health appeared to be impaired by the presence of the adenoids but who suffered from nerve-deafness and not obstructive. This, however, is the exception and the rule remains.

In judging as to the importance of nasal spurs, we may be very much misled if we are guided merely by inspection. We must remember that the majority of so-called "spurs" run obliquely upwards and backwards and, therefore, in the direction of the current of inspired air. What, therefore, may to our eye look like a very formidable obstruction, may be in reality nothing of the kind and, therefore, in no need of removal.

The debates in our British societies seem to have interested one of our German confrères, Dr. Röpke of Solingten, who, in connection with his studies on the injuries of the nose and its accessory cavities, investigated the question of the influence of nasal obstruction of the ear.16 He found that in the large majority of cases the hearing-power was lower on the side on which the nose was obstructed. If there was lowered hearing power on both sides, it was almost invariably the ear of the side on which the nose was obstructed, which was the worse. A further outcome of the investigations was that the hearing (still in the majority of cases) was improved or even became normal within a few weeks after operative correction of the nasal obstruction, without catheterization or any other therapeutical measures being adopted for the middle ear. He attributed the aural trouble rather to the stagnation of the secretions behind the obstruction and to their being driven up the Eustachian tubes, than to the comparative negative pressure on which others have laid considerable weight and which I also think is not without some influence.17

^{15.} Brit. Med. Jour., Dec. 14, 1901, p. 1780-81.

Die Verletzungen der Nase, etc., Wiesbaden, 1905, p. 39.
 It may be asked whether the "negative" pressure occuring during inspiration is not exactly counterbalanced and neutralised by the "positive" pressure

We have, therefore, to decide whether the apparent obstruction is acting in reality as such and also whether the hearing is improved by ventilation of the tympanum.

NASAL OBSTRUCTION AND EUSTACHIAN CATHETERIZATION.

I formerly found many cases in which the presence of a septal spur or deflection interfered with the passage of the Eustachian catheter as usually practiced, and I have seen some in which practitioners of experience had pronounced the passage of the instrument as impracticable. One enthusiastic nasal operator glibly suggested that in such circumstances the obstruction should be removed.

By considering, however, the fact I have just recalled, that spurs generally run upwards and backwards, I hit upon the idea of introducing the catheter with the concavity upwards, the point lying on the floor of the nose under the anterior part of the spur. will be readily seen that the farther the point advances inwards the more vertical room there will be for it under the spur, and thus placed it will get freer instead of more jammed, as it would be if the ordinary position were adopted. I published this in detail in the British Medical for September 28, 1901,18 having found it then as now of the greatest value in what seemed impossible cases. In the first stage the tip of the nose has to be tilted well up, the shank of the catheter to stick up in the air, and the beak has to lie on the floor of the nose like the head of a golf-club on the turf. I have, therefore, ventured to christen it the "golf-club" method. friend, Dr. Zarniko of Hamburg, has independently arrived at the same idea (a very natural one to a rhinologist) and published it in the second edition (1905) of his work on the diseases of the nose.¹⁹ As he states that he has seen it nowhere precisely described I am sure my publication of it has not come under his notice.

IMPORTANCE OF SOME OF THE SMALLER TECHNICAL DETAILS.

I wish in the first place to state my conviction that many patients whom I have failed to benefit, have received benefit from colleagues into whose hands they have subsequently passed, owing to my having failed to carry out some small technical detail as thoroughly as I might have done. The converse also is true, and among the details which have been apparently imperfectly carried out, have been the tightening of the relaxed membrane, the full and complete

produced by expiration. Probably it is in many instances, but any expansion of the erectile tissue of the turbinals, or still more, any insuction of the alæ nasi during inspiration would exaggerate the inspiratory negative pressure out of proportion to the opposite effect of expiration.

^{18.} Brit. Med. Jour., Sept. 28, 1901, p. 890.

^{19.} Krankheiten der Nase, etc., Berlin, 1905, p. 285.

use of the Eustachian catheter and bougie, and the application of the cotton-wool drum.

In some cases the patient has assured me that instruments (catheters) had been passed up the nose, but that the ear had never before been so freely opened. What I have said with regard to the difficulty occasioned by a septal spur, explains some of these incidents. I would also attach importance to use of the intra-tympanic gum-elastic catheter of Weber-Liel. The fact of it being in situ in the Eustachian tube can be settled so decidedly by auscultation during inflation, that it can be used with a degree of confidence that the solid bougie does not give. In most cases, however, the fine transparent celluloid bougie serves our purpose, and I am indebted to Thost for an addition to its effect, namely, practicing vibration while it is in situ, as devised by Ernst Urbantschitsch. The vibration is effected by any of the ordinary mechanical external vibrators applied on the ear, on the mastoid or, as I find best, over the Eustachian tube on a pad of folded linen between the lower jaw and sterno-mastoid muscle. The outer extremity of the bougie should vibrate visibly. Thost's paper appears in the Festschrift dedicated to Professor Lucae.20

The presence of general or circumscribed relaxation of the membrane is of course to be discovered by means of Siegel's suction-speculum, which should be in more constant use. The application of contractile collodion is, in my opinion, the best local treatment and I feel convinced that even after the layer has peeled off, the membrane remains somewhat tenser than before.

The artificial drum of cotton-wool, secured by a thread and moistened with paroleine, seems not to receive the routine use which it deserves, if I may judge by the cases calling for it which have come under my notice, in which others have not tried it.

LIGATION OF JUGULAR VEIN.

Some observations on the question of ligation of the jugular vein, which I communicated to the Otological Society of the United Kingdom in June of last year,²¹ met with the opposition which any views suggestive of abstinence from operative interference are apt to arouse. From remarks since made to me they appear also to have aroused some thought as to whether this operation ought to be performed as frequently as is done, and whether its effect is as innocuous and beneficial as is generally supposed. I will not trouble you with all the various arguments, but will remind you that

^{20.} Berlin, 1905, published by Sprenger.

^{21.} Trans., vol. vi, p. 95, also "Journal of Laryngology," vol. xx, No. 9, p. 453.

the experience of Macewen, confirmed by Heine,²² Cheatle and myself among others, shows that a large number of recoveries from sinus-phlebitis can be brought about by operation on the sinus itself without ligation of the jugular. That Macewen's remarkable series of successes²³ without ligature would be infinitely continued I am not, however, prepared to think likely.

In cases of thrombosis in the jugular bulb with pyemic symptoms, ligation and opening of the jugular is in my opinion most formally indicated, as it is also when the trunk of the jugular is obviously the seat of an infected thrombus. There is in most subjects ample means for the establishment of collateral venous circulation, but this affords at the same time free access for the infective materials into the general venous circulation and the lungs. When gradual occlusion by a growing clot takes place, the collateral circulation is steadily established, but when a ligature is applied on a non-occluded vein, the sudden disturbance of circulation and reversal of current is not so easily disposed of. I, as well as others, have seen proptosis from thrombosis in the cavernous sinus follow the operation and I have after death seen the pus extending down the deep veins of the neck after I had ligatured the jugular and drained it with utmost thoroughness.

You need not be reminded that half the cases of cerebellar abscess are associated with lateral sinus phlebitis and Pritchard has pointed out that in otitic abscesses in the cerebrum and cerebellum, the disease can generally be traced along the veins emerging from the part. The lateral veins of the cerebellum, according to Poirer, are directed outwards towards the circumference of the organ and terminate for the most part in the corresponding lateral sinus, the most anterior ones in the superior petrosal. Dr. F. W. Mott in a private communication states as follows: "The fact that the lateral veins receive the vein of the nucleus dentatus is, in my opinion, of considerable importance in connection with the formation of an internal abscess of the lateral lobe of the cerebellum by a direct extension of an infection of the lymphatics from the lateral veins to the internal structures of the organ. From this it appears that ligature of the internal jugular vein would certainly lead to venous stasis of the whole lateral lobe of the cerebellum of the corresponding side."

In the case of occlusive clot, such as is common in chronic cases, a ligature can do little or no harm beyond, of course, the damming of the inferior petrosal sinus, but when, as in acute cases no such

^{22.} Operationen am Ohr., Leipzig, 1904.

^{23. &}quot;Pyogenic Diseases of the Brain and Spinal Cord," Glasgow.

occlusion is present, I feel great diffidence in applying one. The opinions of authorities on this subject vary, and I beg to refer to my paper in the sixth volume of the Transactions of the Otological Society and to ask for an unbiased and "unheroic" consideration of this problem.

THE PRESERVATION OF MATRIX IN CHOLESTEATOMA OF THE MIDDLE EAR.

It must have happened to all who have had much experience in otology to have met with one or two cases in which the attic of the tympanum is lying freely open, the outer wall having completely disappeared while the cavity is entirely lined by a smooth pearly white membrane. Occasionally the loss of bone extends to the postero-superior wall of the osseous meatus, leaving an opening through which a cavity much larger than the antrum, though including this, is visible, the walls being covered by the same kind of shiny pearly white membrane. The patient may be free from all discomfort except the occasional accumulation of desquamative epithelial products which are easily removed. In such cases there has generally been a history of chronic suppurative inflammation of the middle ear of several years' duration, characterized by the occasional occurrence of severe headaches and the extrusion of white macerated skin-like formations.

The course of events in such cases has been the development of the so-called cholesteatoma consisting essentially of a membrane lining the natural or pathological cavity in the petrous bone, desquamating so that the cavity is filled with epidermoid scales, the central ones of which have broken down into cheesy masses containing cholesterin crystals. Under the influence of moisture or inflammation the desquamation is increased and the cavity thereby filled and distended; the pressure causes the walls of this to give way at their weakest part, and if, as in the fortunate cases we are describing, this is the part presenting towards the tympanum and external meatus, the bone in those places is gradually eroded until the cavity is laid so freely open that there is sufficient room for the exit of the contents.

The course of formation of such a cholesteatoma appears to be as follows: As the result of a suppurative inflammation extending into the antrum and adjacent cavities, the lining membrane becomes covered with granulations similar to those on an ulcer on the surface of the body; in some cases, especially the tubercular ones, progressive caries of bone results and very little or no attempt at healing takes place. In the absence, however, of such a dyscrasia, the smaller bony trabeculæ give way and a comparatively large

cavity remains, lined with granulation tissue. As the suppuration subsides the edges of the perforation in the tympanic membrane may become cicatrised, and it is possible for the granulations to subside, and a return to a fairly normal mucous membrane be effected. Should, however, the perforation in the membrane be peripheral, and there is a ready continuity between the epithelium of its outer surface and the granulations on the wall of the tympanic cavity, the same changes take place as on the surface of a healing ulcer on the leg. The cuticular epithelium proliferates over the granulations from the periphery onwards until the whole ulcer, if not too large, is covered with a cicatrix which may be a fair substitute for skin. In the middle ear this process has been traced, as shown by microscopical examination, to a considerable extent into the tympanic cavity; there is no reason why it should not continue through the aditus into the antrum, at first reaching only those portions of the walls of the cavity which are nearest this orifice, then gradually extending over the parietes until the whole cavity is lined with an epithelial cicatrix. Sometimes in performing the radical mastoid operation one finds the cavity in this condition. At other times the part nearest the mastoid surface is filled with granulation tissue and the shiny cholesteatoma membrane is found on the inner wall of the antrum and the portions adjacent to the aditus. Probably in this case the epidermization was gradually extending towards the remoter spaces and in time would probably have eventuated in the formation of a typical cholesteatoma. Of course it would be impossible to predict whether this would be favorable or unfavorable to the patient's life, as the centrifugal pressure exerted by it might result in erosion of the bone in the direction of the lateral sinus or the other cranial contents; if the circumstances were favorable and the locus minoris resistentia was in the direction of the tympanum and external auditory meatus, the bone might give way, as in the instance I first quoted, and the contents of the cavity find their way into the outer passage of the ear. The lining of the cavities thus displayed is sometimes as perfect as could be desired and when freely exposed to the drying influence of the air and kept dry by the avoidance of the introduction of water and by the use of alcoholic instillations, the patient's condition may be one of complete comfort and safety. The main postulate is that the opening should be sufficiently wide for the entrance of air and for the immediate escape of desquamative products. It need hardly be said that it is only in exceptional cases that this takes place spontaneously in the favorable direction, and as soon as the condition of cholesteatoma is recognized the surgeon should be ready to carry

out the operation necessary for its free opening. In the absence of such evidences of pressure as pain, vertigo, and bulging of the postero-superior wall of the meatus, he is justified in giving a trial to such dehydrating measures as the instillation or injection of alcohol in the form of rectified spirit, which may at first be diluted to the extent of 50 per cent. This preliminary treatment is all the more called for inasmuch as it is difficult, and perhaps impossible, to say beforehand how far the desquamating membrane extends into the mastoid cavities, and if this extension is very limited the necessity for operation may not arise. On the other hand, in the presence of pressure symptoms, no delay is permissible, and a free opening after the manner so well formulated by Stacke, is called for. If, when the opening has been made, it is found that the cholesteatomatous condition does not extend deeply into the cavities but that they are filled with granulation tissue and broken down bone, the hole should be thoroughly scraped out and suitable plastic arrangements for lining the cavity adopted. If the cavity is very small, any of the various well-known flaps may be formed, and cicatrization over the granulating surface encouraged, the rapidity of healing being in proportion to the smallness of the area which has to heal. Should the cavity be fairly large, I have no hesitation in saying that it should be lined by means of Thiersch's skin graft according to the technic so perfectly devised by Ballance. Even in the hands of one who is only moderately expert in the technicalities of this process, the results far surpass those obtainable without it in cavities of the same size.

In those cases, however, in which the cicatricial process has extended over the whole of the walls of the cavity, I venture to believe that we have already to hand as good a lining as we can desire, and that it is not merely a justifiable, but a very desirable economy of the patient's time and tissue to preserve and make the most of the lining in question. I have in several cases put this principle into practice and found a complete healing of the parts and drying-up of the discharge produced with a rapidity and ease unequaled in other cases. Under such circumstances I content myself with gently scraping out the contents of the cholesteatomatous cavity and leaving the white shiny membrane in situ, swabbing it carefully but thoroughly with rectified spirit. I then insufflate a quantity of sterilized aristol, a substance recommended by Mr. Ballance for use when plugging the cavity he has lined with Thiersch's grafts, applying over this a light tampon of iodoform gauze, and, after about a week, starting the instillation of alcoholic drops.

In cases then, and there are such, in which a shiny uniform membrane is found lining the cholesteatoma cavity, I see every reason to think that this should be preserved instead of being scraped out, as is recommended by most operators up to the present. Should the membrane be pulpy, imperfect and not homogeneous, I am equally convinced that it is our duty to practice complete erasion and to line the cavity by transplantation of a skin graft.

In conclusion, although I can not boast of having made any original addition of value to our science and can merely pose as, at the most, a lucid expositor of elementary otology, I venture to believe that there have been few items of practical value published in French and German which I have failed to study for the benefit of my students and myself. I am bound to acknowledge above all our indebtedness to our German collaborators, whose industrious and enterprising use of their opportunities has so greatly advanced the usefulness and reputation of our art, as also to our French fellow-specialists who have clarified and systematized so much that was obscure and involved. It is to an Anglo-Saxon, however, that all are indebted for the establishment of otology on a sound basis of pathological anatomy, and Toynbee's collection is still an illustration of the remarkable powers of initiative which individuals of our race occasionally display, in spite of the absence of any present aid or immediate hope of reward. May we hope that in the friendly rivalry among the nations, others like Toynbee may help us to attain for Anglo-Saxon otology the position we would desire for it.

VOTE OF THANKS.

Dr. Ballenger said that Toynbee is revered for his well-known work on the "Pathology of the Ear." Hinton is well known through the production of his magnificent water-color drawings of the drumhead. Dr. Grant, who has impressed the otologic world as its present-day English representative, should be named with Toynbee and Hinton. Dr. Ballenger said he had the pleasure of offering a vote of thanks to Dr. Dundas Grant for his excellent address.

Dr. Dundas Grant expressed his thanks for the kind reception given to his paper. He attributed it to some extent to the paper being practical, and to that warm corner which Americans have in their hearts for those who come from the little isle beyond the sea. He thanked them for the patience with which they had listened to him, which was a great compliment and one of the most interesting phases of his whole life. He was glad to be able to meet his American brethren so pleasantly.

REPORT OF A CASE OF ACUTE MASTOIDITIS.

COMPLICATED BY AN EXTENSIVE DESTRUCTION OF THE ESOPHAGUS WITH RUPTURE OF THE ESOPHAGUS, LEADING TO A PROFUSE HEMORRHAGE INTO THE LEFT PLEURAL CAVITY,

THE STOMACH AND MEDIASTINUM.

J. O. McReynolds, M.D. Dallas, Texas.

The difficulty of the task before me will be appreciated when we remember that the literature on this subject is conspicuous by its brevity and incompleteness of reports, which are conditions antagonistic to a thorough classification of phenomena and a correct estimate of their value.

Sir Morell McKenzie of London, the most distinguished laryngologist the world has seen, has carefully reviewed the medical literature of the world and has collected more or less fragmentary reports of thirteen authentic cases of rupture of the esophagus, all terminating fatally from the resulting hemorrhage. And as these cases covered a period of about two hundred years and occurred in different parts of the globe, some of them occurred under conditions that were unfavorable for accurate study and thorough description. So with your permission I will pass at once to a consideration of a case recently occurring under my observation and will conclude with some deductions which I feel would be worthy of our thoughtful regard.

CASE 1.—This case presented two separate and distinct conditions, having no connection whatever with each other. One condition was a perfectly plain acute mastoiditis supervening upon a sub-acute involvement of the mastoid antrum and middle ear cavity. The other condition was a complete rupture three inches in length in the lower third of the gullet supervening upon an extensive destruction of the esophageal walls, with resulting profuse and fatal hemorrhage into the pleural cavity surrounding the left lung, into the stomach and mediastinal space.

I was called first in the morning to see the patient, a robust looking boy, several days before his death and found him suffering with an acute inflammation of the middle ear, with some pain and tenderness over the mastoid process and a small amount of discharge from the middle ear. I prescribed for him and left word that I would return to see him again in the afternoon. But before the hour for my second visit I received a telephone message that he was

so much better that it was unnecessary for me to call. I then did not see the patient again for a few days, when a received a telephone message that the family physician, Dr. A. C. Graham, was present and felt that my services were needed. I immediately visited the patient and found that he had just had a well marked chill with a sudden rise of temperature to 104 F. in the mouth. I inspected the drum membrane and found that the discharge had ceased, the membrane was of a dark mahogany hue and was bulging decidedly, especially in the postero-superior quadrant. The family physician was unable to explain the sudden rise in temperature by his physical condition other than as found in the region of the ear. So I made the usual incision through the membrane, allowing the bloody contents of the cavity to escape, thus relieving the tension in the middle ear cavity, and applied the usual subsequent treatment. The next morning the fever was still 104 in the mouth. The discharge from the ear had about ceased, the mastoid tenderness, while not extreme, was quite distinct, the drum membrane was dark red and covered with dead epithelial cells, the muscles of the neck were exquisitely tender on pressure and the slightest movement of the head would cause the patient to cry out with pain, vomiting which had now lasted for several days was becoming more pronounced, no food had been retained on the stomach for several days and frequent vomiting of bile had led to the administration of the mild chloride of mercury. The patient was growing weaker and a consultation was held, at which were present Dr. A. C. Graham, Dr. J. M. Pace, Dr. D. E. Seay and myself. The physical examination of the abdomen and chest failed to reveal any explanation of the high temperature, general prostration, frequent and persistent vomiting and intense thirst. All the physicians present concurred in the conviction that a prominent factor in the production of his symptoms was a rapid invasion of the inflammatory process from the mastoid antrum to the remaining mastoid cells, and this conviction was strengthened by the sudden cessation of discharge from the ear preceding the onset of the chill and subsequent elevation of temperature. These features were regarded as all the more significant because the patient had been for several years the subject of recurring attacks of middle ear inflammation with purulent discharge, since it is well known that in just such cases we will frequently find a very decided involvement of the deeper structures about the ear, with a minimum degree of superficial disturbance. The existence of the ear affection was absolutely clear and there was no other diseased condition that was discoverable. Our duty then was positive and could not be disregarded. The indication was imperative

to offer the patient the only means of relief possible in such a condition. Hence the unanimous conclusion of all the attending physicians was that a mastoid operation should be made without delay. The patient took the chloroform well under the careful and cautious administration at the hands of Dr. S. R. Milliken. The pulse under the anesthetic was reduced from 120 to 90 and continued strong and regular. After the operation the pain in the neck, which had been very severe previously, now entirely disappeared, and the patient rested well with the exception of the vomiting, which had now been present for several days. The conditions found on opening the mastoid were just as we had rationally anticipated. There was a decided amount of dead bone in the region of the mastoid antrum, which contained a considerable quantity of granulation tissue, which we find associated with the formation of pus and dead bone. As the acute invasion of the remaining mastoid cells had existed for only about twenty-four hours there was only a limited amount of pure pus found in this situation, but this was quite distinct and was associated with an intensely inflamed state of those cells which had not yet become filled with pus. The picture emphasized in the most positive way the wisdom of operating before the purulent infection had extended to the brain. The operation was made in the usual way with the utmost caution and with the profoundest consideration for the important structures found in this region. And while the process of bone destruction had already proceeded to the walls of the lateral sinus, not the slightest injury was inflicted upon any vital areas as was evident at the time of the operation and was subsequently demonstrated at the autopsy. The examination of the throat at different times showed a normal condition.

After the operation the pulse and respiration continued strong and regular until the following day about four o'clock in the morning, when I received a telephone message to come at once to see the patient, that he was suddenly and rapidly growing weaker. I hastened immediately to his relief and found him suffering with the characteristic symptoms of profuse hemorrhage, and yet no blood was visible. He had a very rapid feeble thready pulse, very much accelerated respiration and cold extremities and his mind was as usual perfectly clear. I requested the family to summon the other physicians who had been in attendance upon the case, and without delay began the recognized energetic treatment for concealed hemorrhage. At first he responded notably to the measures employed for his relief and then relapsed and became constantly weaker with a pulse no longer perceptible at the wrist. Finally the circulation through the brain became so sluggish that he became

unconscious, bilateral convergent strabismus developed and this was followed by conjugate deviation of the visual axes. The pupils remained normal and vision distinct till towards the close of life, when the pupils became widely dilated. There were no convulsive seizures or evidence of pain, and at no time was there any indication of meningitis. It was about two hours from the time of his sudden decline to the moment when the flickering flame of life went out. This evidently corresponded to the period after the rupture of the esophagus with the consequent internal hemorrhage. Being totally unable to find any satisfactory connection whatever between his unexpected collapse and his ear trouble, which since the operation was pursuing a regular and satisfactory course, I requested a postmortem examination, which was kindly granted by the parents. The autopsy was made within a few hours by Dr. B. Kinsell and Dr. S. R. Milliken, in the presence of Dr. A. C. Graham, Dr. J. M. Pace, Dr. D. E. Seay, Mr. J. T. Berry and myself. The brain was removed completely and most carefully examined throughout its extent and nothing abnormal was found.

The wound in the mastoid region was closely investigated and everything was found clean and correct and not the slightest injury had been inflicted upon any important structure. The process of necrosis had extended inward and backward to the walls of the lateral sinus and forward well into the petrous portion of the temporal bone. Then failing to find any connection between the intracranial condition and the fatal termination the inquiry was extended to the chest and abdomen. On opening the chest cavity everything on the right side was normal, but a large quantity of dark grumous blood was found in the left pleural cavity in the mediastinal space and in the stomach, and there was an extensive rupture through the walls of the esophagus about three inches long just above its entrance into the stomach. The esophagus was deeply ulcerated over a large area, the rupture being due to the destructive action going on in the walls of the gullet. There was no vomiting of blood because any effort at vomiting would only empty the contents of the stomach into the left pleural cavity, with which the esophagus now freely communicated.

In looking over the literature on the subject I find that all of the thirteen authentic cases, reports of which have been collected by McKenzie, died within a short time after the rupture; with but one exception none of them were diagnosed before death and in this case the result was not altered and a fatal termination followed. They were all associated with vomiting but none of them had taken chloroform or had passed through an operation of any kind, showing that the condition is essentially fatal in itself and does not require additional complications to determine the final result. McKenzie states that it is likely that the normal esophagus never ruptures, and certainly this is in harmony with reason and the experience of the world, for we have all seen cases over and over again that would surely have ruptured the gullet if any amount of persistent and extreme vomiting could alone have induced such a re-Moreover, the majority of these cases so far reported had eaten freely a short while before the perforation occurred and the rupture was favored by the sudden expulsion of large masses of food through a weakened and diseased channel. But in the case we are now considering the patient had taken practically no food for about one week and on the contrary had been vomiting at frequent intervals during all this period, and hence no unusual strain was placed upon the organ at the morning of the rupture. In fact the microscopical examination shows an extensive disintegration of the walls sufficient to have caused a large perforation even without the intervention of any such exciting cause as persistent vomiting.

There have been many theories advanced as to the nature of the process existing in the gullet tending to favor a spontaneous rupture, and among these are diphtheria, tuberculosis, specific involvement, cancer antemortem solution from contact with the digestive fluids, mediastinal abscess, and a very attenuated state of the esophageal walls dependent upon a congenital diverticulum. I have at hand sections for microscopical study of the adjacent portions of the esophagus but they do not clearly demonstrate the exact pathological character of the lesion. The case is almost without a parallel in medical literature and serves to impress some very important truths that are sometimes not duly regarded. First, the absolute necessity of withholding our judgment in fatal cases of marked obscurity until the final revelations of the autopsy shall have closed the chapter. Second, the absolute necessity of making not a partial, but a complete postmortem examination in every important case, not confining our inquiry to the organs apparently involved, but directing our search throughout the entire realm of possible disorders. Third, and finally, the plain and positive duty of every honorable member of our honored brotherhood to exert the full force of his influence in directing into channels of conservatism and safety the unstable tide of public opinion in order that mankind may reap the rich harvest of good which a patient and plodding profession has planted.

And our confrère, Dr. Emil Mayer, of New York, who has kindly consented to open the discussion, has reviewed the literature of the

world bearing on this subject and has collected reports of 6 or 7 other cases, making a total of about 19 or 20 cases, including those collected by MacKenzie and the case I have the privilege of presenting to-day. I will not consume your time with further reference to the cases already reported, as Dr. Mayer will present them in full in his opening discussion.

DISCUSSION.

DR. EMIL MAYER, New York (opening discussion on Dr. Mc-Reynolds' paper): The reader of the paper has given us the history of a most rare and distressing affection, one that thousands upon thousands of physicians in active practice have never seen, perhaps not heard of, for in the whole literature of the world there are barely twenty cases of spontaneous rupture of the esophagus. Its study is well worth while, for the questions involved.

It was in 1742, one hundred and sixty-four years ago, that the first case of this affection was published in Latin by the illustrious Boerhaave. His patient was the celebrated Dutch Admiral Baron Wassenaer. The baron, a man about 50 years of age, moved in the best society of Holland, was a diner out and a large eater, though not a heavy drinker. After meals he used to feel a disagreeable sensation in the cardiac region of the stomach and obtained relief by the use of emetics. On the day of his attack, being in the best of health, the baron partook, at his early dinner, of the following substantial repast: Veal soup with herbs, boiled lamb with cabbage. fried sweet bread and spinach, a duck, two larks and a compote of apples. For dessert he had pears and grapes followed by sweetmeats. His beverages were beer and Moselle. Afterward he went out riding, and on his return, feeling uncomfortable in the epigastrium, took three cups of hot thistle tea to induce vomiting, but with poor success. He then drank four cups more of the same decoction, and, whilst straining violently in his efforts to vomit, he was suddenly seized with a terrible pain and shrieked aloud so that his servants ran to his assistance. He explained that something had given way in his stomach and he felt sure he must die at once. Boerhaave was called in consultation, hot fomentations were used and venesection to no avail. He died after a night of most intense agony. At the autopsy the pleural cavities contained 104 oz. of liquid. The material smelt of the roast duck. On the pleura covering the esophagus was a flabby blackish spot about three inches in diameter, in the center of which was a rent one and a half inches

Boerhaave: Atrocis neo descripti prius morbi historia secundem medicæ artis leges conscripta, Lugd. Batav., 1742.

long and a third of an inch wide, which communicated with the gullet. No ulceration or morbid processes were found.

It is not so uncommon for rupture of the esophagus to follow direct injury, such as the swallowing of some powerful irritant, like lye, or of a foreign substance, or from the attempts at their removal, as also of undue violence in the use of bougies.

Two other cases of this affection are recorded, due to external injuries, one by Whipman² of a man who was thrown from a horse, who died eight hours afterward, with symptoms of dyspnea. In addition to a fracture of the skull, there was emphysema in the upper part of the chest and fluid stomach contents in the left pleura. Directly over the diaphragm there was a longitudinal tear in the esophagus. In this unusual case the occurrence, after a severe fall, of displacement of the contents of the stomach is considered likely.

The other case is recorded by Lomax,³ and was that of a woman whose body was seriously injured in an elevator accident. She was not unconscious and did not complain of severe pain. Eleven hours later she died, after a rather rapidly appearing collapse. At the autopsy, a rupture of the esophagus was found directly over the diaphragm, with a stomach contents in the left pleura. She also had multiple pelvic fractures.

Zuppinger* speaks of non-traumatic perforations of the esophagus in children. Gangrene of the esophagus occurred in a 3½-year-old female child during toxemia from meningitis. The second case was an 8-year-old child in whom a peptic ulceration of the esophagus, with severe hemorrhage and rupture, occurred. Two other cases occurred with retro-esophageal abscess and two more perforations occasioned by tuberculous glands ulcerating the esophagus.

Shrubsall and Mullings⁵ presented a specimen of tuberculosis of the esophagus before the Pathlogical Society of London.

Of spontaneous rupture of the esophagus but three other cases are recorded in the American literature beside the one brought before you—one brief article by J. S. Bailey⁶ in 1873, another, a full report, by Reginald H. Fitz⁷ in 1877, the case of the latter having the longest duration, namely, seven and a half days, and the third by Arthur J. Patek,⁸ who reports a case of spontaneous rupture of the esophagus from the service of L. Wolff, a male, aged 32, the patient dying seventeen hours after the attack.

^{2.} T. Whipman: Lancet, Sept. 17, 1903, p. 749,

^{3.} H. E. Lomax: N. Y. Medical Record, Jan. 6, 1906, p. 1.

Zuppinger: Jahrbuch f. Kinderheilk., Bd. lvii, p. 1903.
 Shrubsall and Mullings: Brit. Med. Journal, Jan. 10, 1903, p. 79.

^{6.} J. H. Bailey: N. Y. Medical Journal, 1873, p. 517.

^{7.} Reginald H. Fitz: Amer. Jour. Med. Sciences, 1877, p. 17.

^{8.} Arthur J. Patek: Medical News, May 12, 1904.

In recent years McWeeney⁹ (1900) presented a case of his own before the Pathological Section of the Royal Academy of Ireland, and records seventeen other cases as previously taking place. He says that cases of this occurrence are rare and seem worthy of attention not only on account of the interest attaching to its rarity and the peculiar and alarming symptom with which it is attended, but also because the cases resemble each other so closely in previous history, signs and symptoms that a correct diagnosis is quite within the bounds of possibility and modern advance in the surgery of the mediastinum seems to warrant a hope in the feasibility of successful intervention in some future case. His own case was that of a male, aged 40, who came to the hospital complaining of pain, not very intense, in the lower part of the chest and of swelling in the neck. His face was deeply cyanosed; he seemed to be gasping for breath, pulse quick and weak, and his general condition somewhat collapsed. Neck and face much swollen on both sides due to subcutaneous emphysema, voice low and hoarse and spoke with difficulty, emphysema extended to eyes and down the thorax. Death seven hours after admission. It was learned that the patient was of alcoholic habits and that he had been more or less drunk every night for twenty years. He used to vomit every morning and was much given to dry retching. On the evening before his death he had tinned salmon for dinner, and the following morning retched worse than usual. Nevertheless, he went to his work and while there noticed that his neck was swollen and his collar uncomfortably tight, his breathing became difficult and he felt a good deal of pain in his chest. At noon he went home and his friends brought him to the hospital. At the autopsy, forty hours after death, a perforation one and a half cm, long was found in the anterior wall of the esophagus directly over the diaphragm. He believes that the rupture may be attributed to softening of the walls and sudden pressure from within.

Bowles and Turner¹⁰ (1900) report a case occurring in a woman aged 62, who, after having dosed herself with large doses of rhubarb and aloes, took a large glass of salt water to clean the stomach; severe vomiting ensued, epigastric pain, collapse and death in twenty-two hours. The tear found at autopsy was lengthwise in the esophagus, five-eighths of an inch long and one and a half inches above the diaphragm.

Heintze¹¹ (1900) reported a case of spontaneous rupture of the csophagus at a meeting in Berlin. He says that this is one of the

^{9.} E. McWeeney: Lancet, July 21, 1900, p. 158. 10. Bowles and Turner: Brit. Med. Journal, March 31, 1900, p. 763. 11. Heintze: Deutsche med. Woch., July 5, 1900.

rarest pathological occurrences. The patient was a male, aged 43, who had severe pains in the stomach immediately following a meal, collapsed and died in seven hours. A rupture in the esophagus a half-inch long close to the stomach was found; no macroscopical cause was shown; microscopically there were signs of recent inflammation.

A still more recent case is recorded in 1903 by Sarolia, ¹² reference to which is impossible at the present moment.

The most recent contribution to this subject (1904) is in an article read before the Society for Scientific Medicine by Prof. R. Beneke, 13 entitled "Rupture of the Esophagus and Esophagomalacia." Regarding the etiology, he believes that agonal intravital digestion of the esophagus occurs occasionally and may thus readily cause death. This might occur if primary parenchymatous hemorrhages and erosions were present. The juice would produce a pathological paralysis of the cardia and stagnation at the lower end of the esophagus. With an explosive vomit, gastric juice enters the esophagus, does not appear in the mouth, the horizontal position and perhaps unconsciousness of the patient or spastic contraction above prevents, contraction or pressure may occlude the upper part.

If the presence of pleural exudate is diagnosed and puncture shows stomach contents, the diagnosis could be made intravitam. He suggests, too, that more could be learned about these cases if the autopsies were made early with the body face downward, and that more definite conclusions may be expected from animal experimentation.

Morell McKenzie¹⁴ says that vomiting only causes rupture when the contents of the stomach can not be expelled through the gullet at the same rate that they leave the viscus; there must be some form of contraction above to have this occur.

McWeeney believes that softening of the coats and sudden relief of pressure within is responsible. The softening is due partly to intravital digestion occasioned by circulatory disturbances and prolonged sojourn of peptic matters in the gullet from continued retching. There may also be an infiltration, partly inflammatory.

Of all the cases recorded but one was that of a woman. It occurs most often in alcoholics, in connection with violent emesis, once from abdominal pressure, straining at stool.

The symptoms are remarkably similar: dizziness, dread of impending death, severe chest pains, increasing dyspnea, rapidly advancing subcutaneous emphysema and at times mild hematemesis.

^{12.} Sarolia: Scalpel, Liege, 1903, No. lvi, p. 84.

^{13.} R. Beneke: Deutsch. med. Woch., 1904, No. 30, p. 1489.

^{14.} Morrell Mackenzie: Diseases of the Nose and Throat.

Autopsies were nearly alike—one or more tears lengthwise, usually just over the cardia posteriorly or one sided, rarely in the anterior wall; the muscular coat equally torn, reaching the mediastinum and mainly the left pleura; stomach contents in the pleural cavity. There may be softening of the mediastinum and the esophageal wall about the rupture; interstitial emphysema; hemorrhage in the intestinal tract. All the cases recorded died; the bare chance of recovery in this desperate condition lies in the prompt diagnosis and surgical intervention.

We may, therefore, conclude that in the case here presented the question of possible cause of origin stands pre-eminently before us.

Briefly, we have the history of ordinary mastoid involvement accompanied by a distressing and continuous vomiting and inability to retain food.

There was practically an absence of the classical symptoms of rupture of the esophagus, and it is impossible to conceive that the most astute diagnostician could have suspected the presence of rupture, or even disease of the esophagus.

As to its possible mode of origin, I should assume that there was some usual narrowing of the cardiac end of the stomach, or spasmodic contraction of the same, with partial retention of the gastric juice in the esophagus, a peptic digestion, such as Zuppinger mentions in the Jahrbuch für Kinderheilkunde, before cited, as perhaps the only plausible theory.

The case illustrates still further the importance of an autopsy and a complete one in every dubious case, for to the survivors nothing is more distressing than the harrowing thought that more might have been done to save the life of one to whom they were bound by every tie of affection; to the attending surgeon, the knowledge that he has done all that was possible, there comes also the feeling and the assurance that more was impossible to expect of any one, that the fatal ending was inevitable.

How many a confrère rests under the unjust suspicion of incompetence where an autopsy would have revealed his every act to have been all that might be asked of any one, old friends would have remained such, and a higher respect added toward the entire profession.

DR. McReynolds (in closing): I wish to thank the members of this Section for their kind and cordial discussion of this paper. The patient had two separate and distinct affections, entirely independent of each other. The one was clearly recognizable, demanded attention and received the only rational relief. The other was not discoverable and could not have been prevented or remedied even if it had been discovered.

It not infrequently occurs that patients may have two independent affections, as cancer of the abdominal viscera and fracture of a limb, and the fact that the former may be obscure or may prove fatal does not in any way relieve us of the obligation of giving prompt and efficient treatment for the latter.

As bearing upon the question of causation, it might be well to state that the following day after the burial of the child I was called to attend his mother, who had developed a typical case of pharyngeal diphtheria. But the microscope failed to establish any diphtheritic lesions in the esophagus of the child.

ASPIRATION OF THE TYMPANIC CAVITY IN OTITIS MEDIA.

PERCY FRIDENBERG, M.D. NEW YORK.

A truism of metaphysics compares human progress to a spiral which at certain points returns upon itself before again advancing rather than to a straight line of uninterrupted advance. The last decade has seen notable improvement in the technic of aural surgery in the recognition and management of the otitic cerebral and vascular complications and in the prophylactic therapy of the nose and naso-pharynx. Of late we seem to have come to an end of innovations and explorations and to be devoting more attention to some well-known parts of the domain of otology with a view to possible improvement in method. In this connection I may mention the blood clot dressing in the attempt to obtain early closure of the mastoid wound, and the treatment of middle-ear and mastoid inflammation by local hyperemia, the congestion treatment of Bier. There is still some doubt as to the former procedure being based on sound principles of surgery and quite decided doubt as to its practicability. The first reports in regard to Bier's treatment were uniformly favorable, and those from the surgical clinic at Bonn, as might have been expected, quite enthusiastic. A more general trial of the congestion method in other institutions and countries resulted in a less unanimous verdict, and now we are beginning to hear of the failures and dangers of the procedure. Whatever the advantages of constriction and hyperemia may be in inflammatory disease of the limbs and joints, or of the skin, I think that it is a very dangerous and objectionable form of treatment for otitic disease. The prime requisite, it seems to me, is free drainage, especially in acute cases, and any interference with this process is intrinsically and radically wrong. In acute otitis media we perform paracentesis as soon as we have evidence of an exudative inflammation in the middle ear, and encourage the discharge of infectious material by gravity, heat, irrigation; in fact, by every means in our power. This subject is at least as important in the end as sinus thrombosis and brain abscess, for rational treatment of middle-ear disease, and incidentally, let me repeat, of naso-pharyngeal catarrh and hypertrophy, represents the stitch in time which saves not only stitches nine, but life as well.

There is a perfect chain from adenoids to acute otitis, to mastoiditis, to thrombosis, labyrinthine suppuration, meningitis or abscess, and, while I do not wish to claim that the intracranial complications are preventable, I do maintain that the chain can be broken, and is best broken at its weakest point. This is the treatment of the naso-pharynx, and if this point is past, and if in a specific case we are in the presence of a florid otitis, we can break the chain at its second link almost as easily by free paracentesis and free drainage.

The latter process is immeasurably assisted by aspiration of the tympanic cavity. The factors are mechanical as well as physiologic. The first effect of suction is to cause free bleeding from the mucosa of the middle ear, thinning the inflammatory exudate and thus facilitating its removal by gravity, syringing or aspiration. Local depletion is a secondary result and this, as is well known, has a most favorable effect on pain and inflammation, especially where, as in these cases, the pain is due to tension and pressure.

It is still an open question whether fresh serum has a marked bactericidal action, but there can be no doubt that it is much less septic than the fluid in the inflamed middle ear, so that dilution with fresh blood can be only beneficial. The effect of aspiration on the cut in the drum is to cause it to gape widely or to open if occluded by blood clot. This is an obvious advantage and one of practical value.

No special apparatus is needed. The method is ready at any moment. Any glass bulb will answer which will plug the meatus, does not have a sharp tip to cause possible injury, is wide enough to be easily cleaned out, and will stand boiling. Its diagnostic use enables us to get a large amount of fluid matter from the middle ear which is received directly into a sterile receptacle, without contamination, giving ideal matter for bacteriologic examination, blood count or Widal's test, which may be of great importance for a dif-

ferential diagnosis in otitic complications or suspected general disease. It has suggested itself that the suction acts very much like a leech bite or wet-cup, abstracting blood and tiring out the walls of the small vessels by continued negative atmospheric pressure (aspiration) and so producing a depletion in the congested area, together with a reactive hyperemia at the site of the hypothetic leech bite, i. e., the incision and the mucosa of the middle ear. I believe this is a very much more exact way of using the principle of local blood abstraction than by putting a leech on the tragus or the mastoid. It seems to me to be in line with the method of congestive hyperemia of Bier, besides being free from a number of objectionable features connected with the application of a constricting bandage around the neck which has to remain for 24 hours or more, and is very irksome, if not intolerable. The degree of hyperemia, whether red or blue, has to be carefully watched and the technic has to be learned by experience.

While drainage can be assisted, it can also be opposed, and any methods which interfere with it can not be too strongly condemned. Among them I will mention plugging the external canal with a socalled drain, putting ice bags on the ear or mastoid, producing hyperemia in the middle ear by any method and, finally, Politzerizing or catheterizing in an attempt to blow secretion out through the drum opening. The danger is obvious and real, and no theoretic considerations should tempt us to overlook them. It has been claimed that the mucosa of the aditus is so swollen that it blocks off the antrum from the middle ear so that pus and germs could not be blown into the accessory cavities of the middle ear. I need hardly lay stress on the visionary quality of this theoretic safeguard. We know that in many cases, in spite of this protection, germs or pus do get into the mastoid cells, even where there have been no mechanical procedures tending to drive them there, so that we would naturally avoid any measures which would have this effect. DISCUSSION.

DR. W. SOHIER BRYANT, New York City, said that this method of suction is especially useful in cases in which the perforation of the drum-head is very small, and when there is some special objection to enlargement. The method he has used for the last three years is to cover the whole auricle with a glass bell fitted hermetically and apply suction through a rubber tube attached to a nipple on the bell.

DR. DUNDAS GRANT, London, Eng., said Dr. Fridenberg has formulated the application of a very important principle for evacuation by aspiration, and the importance of it has been accented considerably by some observations that were made by Dr. Milligan and Professor Young of Manchester, who were looking into the tunica between the different cavities of the middle ear. They found that of course if cigarette smoke was forced up the Eustachian tube, that was the test, it found its way very readily into the mastoid cells. Of course, when the mastoid was opened externally it found

its way there all the more readily. But it found its way there even if the tympanic membrane was open, in spite of the escape allowed through the tympanic cavity. Still further they found if the opening in the mastoid cells they had made was covered up by a microscopic slide so that they could see into it that this smoke was driven into the mastoid cells even when that opening was closed, and when the tympanic membrane was large. It shows that cauterization infection is a possible source of danger, and that the method of seclusion is all the more necessary. It used to be done by means of Siegle's speculum, but as Dr. Fridenberg has also found out, it is rather painful inside the nares, and then the apparatus which Dr. Stuckey was admiring so much yesterday has been introduced, and Dr. Grant said that he himself had used it on one or two occasions, and its use can be repeated several times after paracentesis. Solomon states that he has reduced the mastoid symptoms in several cases by its use. But Dr. Fridenberg's simple apparatus seems to be very suitable to prepare and accompanied with as little discomfort as possible, and Dr. Grant thinks its use is advisable. Returning to the danger of cauterization, Dr. Grant said that anybody who has read the valuable paper of Dr. Schive at Munich will understand the rule has been to cauterize freely and the results have been extremely good. In practice they should not be too much afraid of insufflation, but, on the whole, it is desirable to avoid it.

Dr. Holinger, Chicago, said that Dr. Fridenberg's paper was of great interest to him because he himself had been working on this line for the last year or so. The result was the construction of a little more complex instrument than Dr. Fridenberg had just shown. Its idea is this: The air is exhausted out of a tank with a vacuum gauge attached to it. The vacuum is created in the tank by a water vacuum pump. Thus a vacuum of any desired height, high or low, can be obtained and the operator can not only aspirate, but at the same time keep the parts aspirated under control of the eye by means of a Siegle otoscope. Dr. Holinger does not limit the instrument to the ear, but uses it on the nose as well by constructing an instrument on the line of a Siegle otoscope, but fitting into the nose. In empyema of the different cells he can see where the pus comes from during aspiration. The instrument will be on the market soon, when he will give more extended records of his experience with it.

Dr. Percy Fridenberg, New York City, said he was pleased to hear Dr. Grant cite the experiments with tobacco smoke showing the ease with which matter can be carried into the mastoid from the middle ear by an air pressure. This is one of the objections to Politzerization, which, with catheterization, Dr. Fridenberg considers dangerous in acute otitis. Suction produces exactly the same effect by negative pressure with no possibility of

carrying septic material into the antrum or mastoid cells.

The apparatus which Dr. Holinger has experimented with is certainly very scientific, more so than Dr. Fridenberg's, but for general use Dr. Fridenberg does not think it will be so satisfactory. He wanted an apparatus which could be boiled right then and there, and could be used quickly. As far as seeing is concerned, the operator does not see much on account of the fluids encountered. The apparatus may be of use for comparative observations. The objection to the Siegle otoscope is that it is not easily disinfected. Dr. Fridenberg said he uses suction only when there is fluid in the tympanic cavity. He has had no experience with it in cases of chronic otitis. There is another use for it in a supplementary way, and that is in small children and infants in whom there is a good deal of difficulty in seeing the drum, even when a general anesthetic is used. By aspiration it is known at once whether the tympanic cavity has been entered and whether there is free discharge or not.

THE SAFEST METHOD OF USING PARAFFIN SUBCUTANEOUSLY.

S. H. LARGE, M.D. CLEVELAND, OHIO.

In bringing this subject before you, I wish only to describe Prof. Gersuny's latest method of injecting paraffin subcutaneously. Gersuny was the first to use paraffin subcutaneously, and his method then was to inject paraffin which was at a low melting point—warmed—into the subcutaneous tissues. After he had two very serious complications, one of emboli of the lung and the other of blindness, he adopted the method which I wish now to describe.

The site to be injected is made aseptic by the use of soap, alcohol and the bichlorids. The syringes, two in number, one large and one small, are boiled and the small one filled with Schleich's solution and the larger one with paraffin. The hypodermic needle must be made to fit both syringes. He injects the Schleich's solution under the tissues and then aspirates. If, in aspirating, the Schleich's solution remains clear, showing that no blood vessel has been entered, he attaches the large syringe containing the paraffin (which has been allowed to become semi-solid) to his needle, which has been left in situ. The paraffin is injected slowly and great care must be taken not to inject too much at a sitting. The Schleich's solution also acts as a local anesthetic, thus making the operation perfectly painless.

I had the pleasure of attending Professor Gersuny's clinic in Vienna last year and saw in use his paraffin for all kinds of deformities, also for very many different affections, among which the saddle-back nose, atrophy of the muscles of the face, after the radical operation of empyema of the frontal sinus, inguinal and femoral hernia, incontinence of urine and prolapse of the lower bowel. In a letter from Professor Gersuny which I received last month, he informs me that he has not had a single bad symptom follow this method.

In the last five years I have used paraffin subcutaneously, 24 cases in all, for the following deformities and affections: Saddleback nose, depression after radical operation for empyema of the frontal sinus and in atrophic rhinitis. I have never had any serious accident following, but when I look back I wonder that I did not, especially in those cases of atrophic rhinitis where the paraffin was injected subcutaneously into the tissues of the inferior turbinate. The method I employed was the injection of the semisolid paraffin, using the Herman Smith syringe. I have only used

the aspirating method for the last six months, and must say that I feel a great deal safer after using this later method.

In reviewing the literature, the following serious results have been reported:

Nossermann reports a case of necrosis of the skin.

Hurd-Holden, blindness of the right eye due to emboli of the arteria centralis retinæ.

Mintz, blindness of the right eye due to the same cause.

Pfarmaustiel, a case of pulmonary embolism.

Halban, a case of pulmonary embolism.

Kapsammer, a case of pulmonary embolism.

The only fatal one that I am able to find is that of Koffman, due to embolism of the lung.

To summarize:

In paraffin used subcutaneously, the rhinologist has a very valuable adjunct, providing that:

- 1. It is not used in the hot liquid state.
- 2. That it be injected according to Gersuny's latest method.
- 3. That too much be not injected at one sitting.
- 4. That all instruments, paraffin, and field of operation be made thoroughly aseptic.
- 5. That there be enough loose tissue at the site of operation to allow for the artificial tumor.
- 6. That in cases of atrophic rhinitis the disease has not progressed too far.
 - 7. That paraffin of too high a melting point be not used.

DISCUSSION.

Dr. Mayer, said he would accentuate the use of the paraffin in a solid or semi-solid state. Syringes are now made that will receive it in bulk and send it out into the tissues in that state. It may not be amiss in this connection to briefly mention the case of a boy who had been injected at his own clinic for saddle nose with thoroughly gratifying results. Two weeks later the boy returned with a most distressing looking nose. He had received a blow on the nose and there was a great deal of inflammation about the paraffin injection. This had to be incised and a little pus exuded, and it was an important question to know what could be done. Dr. Mayer said he made an incision along the side of the nose, and with the aid of a small electric heater succeeded in softening down the paraffin so that some came out with the incision, and with the curette he also cut out some pieces, and the result was better than he anticipated.

Dr. Dundas Grant, London, England, said that he uses the method of Dr. Neym of Paris. It is done with a syringe with a very fine cylinder and there is a rod goes through it which may be graduated by clamp forceps, or as Marie has it, by a little ratchet which drives the rod along through the cylinder with considerable force. The instrument has a handle like a pistol. It is made by a Belgian. The main point about it is that there is a little rod of paraffin, which is kept in waxed paper, which has been sterilized and can be put into the cylinder without infection, and the

melting point is 111, but it can be injected cold. In pulling the cylinder out it brings a little thread out into the perforation, and in point of fact closure of the hole is not obtained, but Marie's paraffin is friable and breaks off short and the hole through which the needle is inserted heals up. He has not had a very large number of cases. One patient was a working man who was immensely improved in appearance with his saddle nose. He returned and said his nose had not done so well. He had given up his work and had gone into the business of a stoker. Another patient who did not do so well was a girl who was a cook. That is another business in which the paraffin injection is not a good thing. There should not be such extreme exposures to heat. Dr. Grant emphasized the value of

the cold paraffin of the friable nature.

DR. MURPHY, Cincinnati, Ohio, said he found that injecting at 115 had given him the best satisfaction. He thoroughly sterilizes his paraffin and fills a syringe of considerable force, and when needed it is ready for use. All he does is to sterilize the needle and use the paraffin cold. He has no trouble, always being careful, as Dr. Large suggested, to inject too little rather than too much. One of his patients was fearful because, being a farmer, the paraffin would melt the first hot day he worked in the sun. But he had no difficulty. Dr. Murphy had a woman come who had had paraffin injected, and too much had been used, so that she had much the appearance of having been poisoned with ivy. That was the first impression he had when he saw her. It seemed that the physician had made an attempt at being a beauty specialist. She had a depression under the jaw and he had put some paraffin there. She had some looseness under the eves and he had injected there, and some over the eyebrows, and several large chunks had been injected in the center of the forehead. Dr. Murphy asked her if she wished any more, and she said no she had enough and wanted to be relieved of what she had. It was a puzzling case, but he gave an anesthetic and made an incision under the jaw, and to his surprise, there was no paraffin to be found. It was all new connective tissue. He dissected it out and reduced the bump and did the same over the brow, as there were two lines running out in a peculiar Y shape. By dissecting with scissors and forceps he succeeded by cutting in the line of the muscle and getting it out without a scar. He did not attempt the chunks under the eye. This demonstrates that the stoker Dr. Dundas Grant referred to need not be in so much fear of his occupation, as in this case the paraffin had all become new connective tissue.

DR. ROBERT LEVY, Denver, said that among the serious results following the use of paraffin and one which had not been mentioned, is the production of permanent and disfiguring red nose. In the case of a young girl operated on for saddle nose as the result of congenital syphilis, the correction of the deformity was all that could be desired, but at the end of five years a very unsightly appearance of the end of the nose existed in the nature of permanent redness. To a young girl this condition might be considered as serious as a moderate saddle nose deformity.

Dr. Large said that he had never seen the syringe Dr. Grant spoke of. A Dr. Weaver had a syringe on the same idea for the injection of cocain. By experiments on animals he knew that it becomes replaced by fibrous tissue, and if protection is given it for a while, he does not think there is any danger of melting. He does not like it above 110. The higher the melting point, the harder the tumor. This may cause irritation. In injecting around the eye, much care is needed not to let any get into the loose tissues. As to the red nose, he can not account for it. Maybe the paraffin had been used too hard and caused irritation. To have the tumor soft in certain cases, dilute with olive oil and this will give a soft tumor, and the more oil, the softer the tumor. The oil is finally absorbed.

CEREBRAL COMPLICATIONS OF SUPPURATION IN THE FRONTAL SINUS.—REPORT OF CASE.

NORVAL H. PIERCE, M.D. CHICAGO.

Case 1.—Patient had a temperature of 101, pulse 98. He was well nourished, no history of syphilis. There was pain over left sinus, but no swelling. Transillumination was negative and the sensorium slightly clouded. Could reply to questions in a slow manner, and his wife told me she had noticed the slowness of cerebration since the beginning of the attack, a week before. It began with a cold that was not marked by any peculiarity; stuffiness of the nose and discharge. For a year before he had been healthy as far as nasal symptoms went, but about a year before my assistant told me he had had a similar attack, except it was not so marked; that he had pain on pressure over the left sinus, headache and discharge at that time from the nose. At this time there was little or no discharge from the nose, when I saw him; and on examination I could find no evidences that usually go with frontal sinus abscess, that is, discharge from the orifice of the frontal sinus, no atypical swelling, as they have called the hyperplasia that so frequently occurs about the orifice of the anterior sphenoidal cells or frontal sinus, so that the nasal examination was negative.

Skiagraphy was negative. That is to say, it showed cloudiness on both sides, and the outlines of the frontal sinuses were not well marked. I attribute largely the negative results in this case to the very poor photograph. Operation was performed, the Killian operation, and the anterior wall removed. The sinuses were large, extending posteriorly far over the orbit and the temporal edge; both sinuses were abscessed. The septum had softened and disappeared between the two, and the sinuses were filled with pus and granulation tissue. There was no osteum apparently to the right septum. There was no pus in the nose, and the probe could not be introduced into the nose. The ethmoids were thoroughly examined. The wound was packed, only the left sinus opened; the other side was packed through the opening and the wound closed. Things were worse after the operation than they were before. The loss of consciousness was very much more marked. The temperature arose to 104 the next twenty-four hours, so that the wound was uncovered, and found bathed in pus. The stitches were not removed at this time, but the sinus thoroughly irrigated and redressed. On the next day things were, if anything, a little worse. The sensorium was still more clouded. He could scarcely be aroused at all. At this time

the wound was undressed and a thorough examination instituted. What I had not discovered at the first operation was the necrosis of the posterior wall of the right side, from which I could see pus coming at this time. The walls of the sinus were removed, and the wound packed, open both sides. From that time on the patient gradually recovered. That is to say, in the course of a week the temperature was down to between 99 and normal, and the sensorium was practically normal.

The appearance of the wound after healing was, of course, exceedingly bad. I believe a secondary operation will have to be performed in order to obviate the ugliness of the immense cicatrix, but in this case I would not dare to insert paraffin on account of the very delicate skin which covers the very voluminous scar tissue which is taken up by these two large sinuses.

Now, the epicrisis of this case would be the peculiar course of the disease. Was this case an acute empyemia of the sinus or chronic? Was it acute exacerbation of the chronic empyema, on account of the changes in the bone? I would not hesitate to say that this was simply an acute exacerbation of a chronic empyema, which had produced very little or no symptoms in between the attacks of acute exacerbation, and we know that frontal sinus empyema may go on for years without producing very marked symptoms, and yet very suddenly flare up and introduce the most dangerous conditions. The absence of the train of symptoms was notable. The pulse in this case was never low. There were no symptoms of cerebral pressure. The only symptom was the cloudiness of the sensorium. No focal symptoms. And this is true of brain complications in this region, except in a very late stage.

The negative result of the nasal examination is another important point. We must always remember that we may have a closed or occult empyema of the ethmoid-frontal sinus. I believe that the anatomical division of the sinuses is often misleading from a clinical standpoint. From a critical standpoint we should view the accessory sinuses of the nose in the same manner that we view the divisions of the ear. That is to say, it is best critically to view the middle ear as beginning with the pharyngeal opening of the Eustachian tube, and ending with the most remote air cell in the temporal and occipital bone, and it is best not to dwell too strongly upon the divisions of the accessory sinuses in the frontal, anterior and middle ethmoids and sphenoidal, but regard them as only consisting of air spaces the anterior of which is the frontal, and the posterior is the sphenoidal, all of which are more or less

communicable, one with the other. It is exceedingly important in this case for a thorough operation. It is important in all these cases to remove all the ethmoid cells in operating on the frontal, as shown in a second case, which ended fatally. Therefore, I am an advocate of taking away the entire anterior wall in cases of empyema, rather than doing the Luc operation.

As regards the sear, I think one is as sightly as the other, practically; the sear resulting from the operation whereby we may inspect the entire field as in the Jansen or Luc operation. In these cases we may get very valuable information from skiagraphy, and if it showed a very small sinus, I would, if necessary, in a very beautiful society woman for instance, perform the Luc operation, but if the skiagraph shows an extensive area I should have to insist upon a thorough operation.

The second case, just to get it on the record, as my time is up. was a case in which I was called to the hospital by the physician attending. The man who had operated on the case ten days before had gone out of town. He had performed the Killian operation, and the patient had gotten along very well, except that there had been an immense amount of pus coming from the wound during the interim. Suddenly the temperature rose to 104, consciousness ceased, and I went to the hospital and found the stitches well in place after ten days, and pus welling up from all portions of the wound. The incision was extended backwardly and onwardly. I found a very small frontal sinus, but I found all the ethmoidal cells necrotic, together with the cribriform plate of the ethmoid. The left sphenoid was necrotic and full of pus.

Now, if we are going to operate in these cases we must operate thoroughly. It is exceedingly dangerous to uncover the frontal sinus and leave behind the other cells. We must make up our minds that we have to get them all out, if possible, or better be left alone.

DISCUSSION.

Dr. Bernstein asked Dr. Pierce why he made the statement that it was a poor skiagraph in his first case. Dr. Pierce said he got cloudiness on both sides and he felt sure that the skiagraph was a poor negative. Dr. Bernstein learned from Dr. Goebel, recently, that cloudiness on both sides seemed to indicate frontal fulminate.

Dr. Mayer asked in what condition the dura was in the cases reported by Dr. Pierce. Dr. Pierce said there was necrosis of the posterior wall of the sinus. It is an all important question as to whether one might possibly find it necessary to locate a deep abscess a little further down.

He recalled a case in which a man came to my clinic with acute inflammation of the frontal sinus, and he insisted on an immediate operation. The operation was done that same afternoon, and both cavities were found filled with pus. In those days operating on the sinuses was not nearly so well known as now, and he then did the radical operation through the nose with very good results. There was no further trouble in the posterior wall of the sinus, but it certainly is of very great interest to know that these cases do arise, and when they arise the cosmetic effect must not be considered if there is extreme danger as to life. It becomes very necessary to operate on these cases of a very fulminating character, and the first important thing is to get the patient in as favorable condition as possible and save life and afterward consider what can be done to relieve the con-

sequent deformity.

Dr. Young, Burlington, Iowa, said that, touching the matter of cerebral disturbance in sinusitis, a patient came to him about a year ago with a history of four months' persistent headache following grippe, discharge of the usual character, swelling of the middle turbinates, etc. There was no tenderness over the region of the frontal sinus and no external swelling. On the next day, however, a peculiar, almost erysipelatous swelling came over the frontal bone, mostly on the right side, which extended down into the upper eyelid during the course of the day. Within 48 hours this was reduced to a fluctuating tumor well up on the forehead. Opening this with a bistoury, he evacuated considerable pus, and then, in order to learn the extent of this external abscess, he introduced a probe, which soon dropped into a hole in the bone. The following morning he made the radical operation. When he exposed the frontal bone he found this opening to be about a quarter of an inch in diameter and centrally almost an inch and a half above the ciliary margin. From this opening the bone was chiseled downward and the right sinus uncovered, the septum lying to the left of the median line. After cleaning out this sinus he found a necrotic spot in the septum from which pus exuded. The septum was then removed and the left sinus, also full of pus and granulations, was cleaned out. No perforation of the posterior wall was found. The curious feature of the cerebral disturbance was that during the greater part of these four months the patient felt that he had a dual entity. Part of him was in bed and the other part some place else. This feeling disappeared after the sinuses were cleaned out. He made a slow but, on the whole, a satisfactory recovery and, although the external wound is not entirely closed, he is in fairly good condition.

Dr. Pierce, replying to a question by Dr. Levy, said that his opinion was formed, in reference to the initial process, on the basis of three points: First, there was no swelling anteriorly; second, that the bony walls of the frontal sinus were so extensively necrotic, a condition rarely found in acute cases; third, that the character of the mucous membrane lining the sinus

was profoundly changed in character.

Dr. Levy said he understood Dr. Pierce that it was an acute exacerbation. Dr. Pierce said it was an exacerbation of the chronic condition. Referring to Dr. Bernstein's remark concerning the pictures as poor negatives, Dr. Pierce said he did not expect empyema on the right side, did not know it was there, and that led him to regard the negatives as unreliable.

DR. BERNSTEIN reminded Dr. Pierce that the pictures showed the sinuses to be cloudy on both sides and asked if that would not indicate double

empyema.

DR. PIERCE said it would, but the psychologic process was this: He did not expect empyema on the right side, and, therefore, when he found cloudiness with no symptoms of empyema of the right frontal sinus, when he found cloudiness on both sides he regarded it as negative, but in addition to that the outline of the sinus was so indistinct that he came to the conclusion that it was a poor negative. As to the condition of the dura Dr. Mayer inquired about, Dr. Pierce said he found it covered with granulation tissue, and the bone had entirely disappeared, for about the area of a dime the edge was softened around the hole and the dura was adherent a little further back from the edge of the normal bone. It had been walled in.

RAPID CONVALESCENCE AFTER MASTOID OPERATIONS.

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In recent years, a great advance has been made in the management of the operative and after-treatment of operations on the temporal bone through the teachings of Blake and his followers, most noteworthy among whom are Sprague, of Providence, and Reik, of Baltimore. Blake's doctrine has been that physiological wound repair should be encouraged and that all cases following mastoid operations should not be treated as open sores but allowed to close by the most rapid method which Nature can provide.*

The blood clot dressing and its variations mark a step toward the perfect physiological management of wounds which require for success more careful technique in preparing the patient for operation, in the operation itself and in the after-care, than was formerly of any advantage to the patient. In the blood clot the advantage: of a clean wound with healthy walls are turned to their greatest use. The more rigid technique required in the blood clot demands as clean an operative field as can be made. Dr. Reik has shown how important this is, and with the use of his protective shield he has succeeded in getting the largest proportion of primary unions. The technique of the operation itself must be adapted to protect the tissues which are left in the wound. Lacerations of the tissues, especially the periostium, rough edges due to the use of dull instruments, contusions caused by ligatures, forceps, clamps and retractors should all be reduced to a minimum, and the tisues which have unavoidably been maltreated should be removed before the

Blake-Reik: "Surgical Pathology and Treatment of Diseases of the Ear," Appleton's, New York, 1906.

Society Trans., vol. ix, part 1, 1905, p. 156.

^{*} H. O. Reik: 1. "The Blood-clot Dressing in Mastoidectomy Considered Physiologically," Jour. A. M. A., March 31, 1906. 2. "Some Facts and Figures Relating to the Blood-clot Dressing," Am. Otol. Society Trans., 1906.

Clarence J. Blake: 1. "Mastoid Cases," Am. Otol. Society Trans., vol. v, 1891-3, Clarence J. Blake: 1. "Mastold Cases," Am. Otol. Society Trans., vol. V, 1931-3, p. 23. 2. Address of Welcome to the Section on Laryngology and Otology, Am. Med. Assn. Annual Meeting, 1906. 3. "The Value of the Blood-clot as a Primary Dressing in Mastold Operations," Brit. Med. Assn. Annual Meeting, 1906. F. B. Sprague: "Observations on Two Hundred Mastold Operations," Am. Otol.

W. Sohier Bryant: 1. "A Case of Epidural Abscess," Am. Otol. Society Trans., 1904. 2. "A New Instrument for Mastoid Surgery," The Laryngoscope, St. Louis, vol. xv, 1905, p. 796. 3. "Operative Technique and After-treatment for Mastoiditis, with Epidural Complications," N. Y. Med. Rec., vol. xl, 1906, p. 502. 4. "Results of Improved Technique in Otologic Surgery," Am. Med. Assn. Annual 4. "Results of Improved Technique in Otologic Surgery," Am. Med. Assn. Annual Meeting, 1906. 5. "A Radical Mastoid Operation Modified for the Conservatism of the Auditory Function of the Tympanum," exhibition of a patient, Am. Otol. Society Trans., 1906. 6. Exhibition of a Patient Operated on for Mastoiditis, Complicated by Epidural Abscess, Am. Otol. Society Trans., 1906. 7. "Technics of the Radical Tympanomastoid Operation When Complicated by the Anterior Position of the Sigmoid Sinus," N. Y. Med. Jour., vol. lxxxiii, 1906, p. 751. 8. "Some Modifications in the Operative and After-treatment of Mastoiditis," New York Five and For Information Pagest 1906, p. 210. York Eye and Ear Infirmary Ann. Rept., 1906, p. 81.

wound is closed. The chemico-physiological factors of success are still more important and depend on the following facts, namely, that the blood has a decided bactericidal action; that living tissues can not withstand great changes of temperature or desiccation; that the normal reaction of these tissues is alkaline, and further, that any chemical substance which tends to lower the vitality of the tissues, whether it has a bactericidal action or not, has a retarding effect on Nature's reparative work. It follows then that nothing more active than dry wiping or physiological salt solution, at the temperature of the body, should be used in the wound for cleansing purposes.

The method of closing the wound is of considerable importance, for in this way infection may be easily introduced. Dr. Reik uses a subcutaneous silver wire continuous suture. He thus avoids risk in the use of infected suture material and the puncture of an infected skin. At the same time, he has the advantage of a substance chemically antagonistic to bacteria.

As to the instrumental technique, those instruments and methods which require the shortest time, with the least mechanical jar to the patient, with a maximum of safety, are the means to be used.

The post-operative and convalescent management of the wound is practically nil in cases which heal immediately by first intention. In the large class of cases which do not heal rapidly by first intention or which develop any infection, constant watchful care and nursing are required to minimize the duration of convalescence and to obtain the desired results. The majority of cases do not offer any expectation of complete primary union. A small cigarette drain one-eighth inch in diameter, which should be removed after twentyfour hours, seems to insure a rapid convalescence, and in cases of infection, allows an outlet for the products of inflammation. use of the cigarette drain facilitates the management of all cases advantageously because it does not interfere with the rapid convalescence of the non-infected wound and does hasten the convalescence of the infected. The convalescence of infected cases can be hastened also by following the same principles which are laid down for the non-infected cases, plus the factor of prolonged drainage and cleansing. If the products of inflammation can escape readily, the less the wound is handled, the better will be the result.

Cases showing the application and result of the foregoing principles:

Case 1.—A child, 4 years old. Chronic purulent otorrhea. Swelling and tenderness of mastoid region. Extensive myringotomy was done and a half inch post aural incision was made down

to the bone. The mastoid cortex was found very dense and thick. There were no pneumatic cells and the antrum was very small. A general osteitis was present. The front bent gouge, rongeur and curette were used for excavating. The wound was cleansed with physiological salt solution and closed without sutures. A gauze wick was placed in the canal. The operation lasted twelve minutes. First day: Wound healed by first intention. Gauze taken from meatus which was cleaned with peroxid of hydrogen and wiped with alcohol. Fourth day: Middle ear dry and post aural wound solid. The post aural scar is scarcely perceptible and there is no irregularity of the skin.

Case 2.—A child 3 months old. Purulent otorrhea two weeks. Severe symptoms of mastoid abscess four days. An extensive myringotomy was done. An incision a half inch long was made down to the bone covering the mastoid antrum, the periosteum was retracted, and the bone and antrum opened with a curette to remove the softened bone, granulations and cheesy detritus. The wound was washed with salt solution. A small cigarette drain was inserted in the wound and a gauze drain in the meatus. The wound was not sutured. The operation lasted six minutes. Second day: Middle scar was practically dry and the post-aural wound healed. The scar was not noticeable. The post-aural surface was normal.

Case 3.—Child 4 months old. Acute purulent otitis media with mastoiditis. Extensive myringotomy. Post-aural incision % inch long, opened a subperiosteal abscess. The bone was excavated with a curette, and the granulations and softened bone removed from the antrum and its neighborhood. The wound was flushed out with saline solution and closed, and a small cigarette drain inserted. The operation lasted 15 minutes. Second day: Dressed by house officer. Third day: Wound swollen and discharging, meatus contained fetid pus. Cleansed with peroxid of hydrogen. Fifth day: False membrane covered the wound. Slight fetid discharge in the meatus. Cleansed with peroxid of hydrogen. Ninth day: Wound healed and middle ear dry. Scar scarcely perceptible and post-aural surface normal.

Case 4.—A girl 16 years old. Chronic purulent otorrhea three years. Pain in ear two weeks; headache and dizziness one week. Usual short incision. The antrum was opened with the front bent gouge. Pus was found in antrum and cells. The bone was sclerosed. The radical operation was done with the front bent gouge, rongeur and curette. The dura was exposed over the tegmen antri. A meatal flap was cut. The wound was washed with salt solution and closed without sutures. A gauze wick was put in the meatus and a

gauze dressing over all. The operation lasted 45 minutes. Third day: Wound healed by first intention; wick removed. Seventeenth day: Middle ear practically dry. Twenty-first day: Middle ear epidermatized. Post-aural scar linear and scarcely perceptible; post-aural surface normal.

Case 5.—Woman 27 years old. Caries of tympanum and chronic purulent fetid otorrhea since childhood. No tympanic membrane or ossicles. Usual post-aural incision. The front bent gouge did the excavating through eburnated bone containing no cells. The knee of the sinus was uncovered. It projected over the antrum. The dura of the middle cranial fossa was uncovered. The usual radical operation was performed. A plastic flap of the meatus was cut. The wound was washed with salt solution and closed without sutures. A small cigarette drain, which was removed on the second day, was inserted. The operation lasted one hour. Sixth day: The post-aural wound was healed, and the middle ear practically dry. Twenty-third day: The tympanum was epidermatized. The scar was scarcely perceptible and the post-aural surface was normal.

CASE 6.—Girl 12 years old. Purulent otitis since infancy. Two post-aural sinuses leading into the bone. The bone was entered with a curette, and with a rongeur and front bone gouge, the radical operation was completed. The dura mater was uncovered in both fossæ. The knee of the sigmoid sinus lay far forward. A flap was cut in the meatus. The wound was washed with salt solution and closed with a subcutaneous silver wire suture. A gauze wick was placed in the ear. The operation lasted 40 minutes. First day: Changed outside dressing. Second day: Wound and meatus foul. Third day: Wound foul, but healing at angles. Fourth day: Sloughy. Cleaned with peroxid of hydrogen. Fifth day: Improved. Sixth day: Wound breaking down. Syringed with peroxid of hydrogen. Seventh day: Wound clean. Thirteenth day: Middle ear practically dry and post-aural wound healed. Middle ear epidermatized. Faint linear scar; smooth post-aural surface.

CASE 7.—Acute infective otitis media of several weeks' standing. Thickening and nipple formation of tympanic membrane. Persistent mastoid tenderness. Complete myringotomy was done; a one and one-half inch post-aural incision was made. Extensive otitis was discovered, with the sinus granulating from the knee to the jugular bulb. A large amount of bone was removed and a broad extent of dura mater in the posterior fossa and a little in the middle fossa exposed. The rongeur and curette were used for the bone work. The wound was washed with saline solution and closed with subcutaneous silver suture. A small cigarette drain was inserted. The

operation lasted 40 minutes. Third day: Removed cigarette drain. Wound healed by first intention, except at hole left by drain. Fifth day: Middle ear dry. Removed subcutaneous wire suture. Wound all healed by first intention. Watch heard 20 inches. Thirty-first day: Condition remained good. Hearing 5 feet for watch. Faint linear scar. Post-aural surface even.

These cases show the results of treatment by blood-clot for simple mastoid, drained blood-clot for simple mastoid, in an infected mastoid wound after the use of a drained blood-clot, in a mastoido-tympanic operation treated by blood-clot, and one treated by the drained blood-clot, and an infected case after mastoido-tympanic operation treated by blood-clot. Five of the cases show rapid and satisfactory healing results by first intention and two by second intention after inflammation and sloughing of the wound. The case of epidural abscess treated by the drained blood-clot was followed by rapid and uneventful healing by first intention.

DISCUSSION.

Dr. Joseph A. Stucky said that last February he began a modified form of this treatment, and has been generally weaning himself away from the old method of packing in radical mastoid operations. As a result he has reduced the time of the postoperative treatment two-thirds. A question that bothered him a good deal in dealing with cases in which there is a most extensive suppuration is: When is a mastoid wound clean? When is it absolutely certain that every little infected cell is cleaned out? Because there has been a doubt in his mind about that question, the bloodclot method has never appealed to him. He has been afraid of it, because he knows of no better medium for the culture of bacteria than the blood. But as he gets the wounds cleaner he has been a little bit more daring and, in his last thirteen out of fifteen cases, he has gradually closed up all the wounds and done no packing after the third or fourth day. Last February he began taking off the outer dressing the second day, removing the inner dressing the third day, and then washing out these old cases of suppuration with a 5 per cent. solution of alcohol and a saline solution, washing it out daily, increasing 1 per cent. of alcohol daily. He knows of no better way of keeping down the granulation than by the use of alcohol, and he has had splendid results. He has never used the cigarette drain, but instead a cordine drain, which has served a splendid purpose. Dr. Bryant did not tell how he managed the inner flap. In three of Dr. Stucky's cases out of the thirteen he anchored the flap with a small catgut, No. 1 or No. 2. He has had trouble with the flap sagging; when it has sagged he has had to pack it again. He had never used Root's protective shield and should be glad to try it.

Another point mentioned by Dr. Bryant was the sloughing. In three of these cases Dr. Stucky had sloughing, but it did not give him any special trouble. Some of the stitches broke, but within nine days the sloughing was all over, and he got very good results. He mentioned two cases which Dr. Vail and Dr. Murphy saw with him, cases of old syphilitic disease of the mastoid in which a most extensive operation was necessary. He closed up the wound in both cases in the method suggested by Dr. Bryant, but the whole cavity filled up with cicatricial tissue, and notwithstanding very vigorous packing, he could not prevent

These cases are five or six months old, and Dr. Stucky can see through a bit of funnel-shaped tunnel clear back through the mouth of the Eustachian tube, out of which the patient blows a little mucus, but there is a very small canal. The hearing in these cases is remarkably good. Dr. Stucky said he would like to know how many cases Dr. Bryant had had with conical occlusion. Another peculiar result is seen in one of these thirteen cases: that of a child twelve or thirteen years of age, in which the radical mastoid operation was performed for one of these fulminating cases of mastoiditis following grippe. The child did beautifully, the wound healed by first intention, there was never any evidence of pus discharged from the ear, but the whole cavity filled up with soft bone-like callus, until there was barely a slit in the canal. It was not cicatricial tissue. It was new bone, and gave Dr. Stucky a little anxiety for a while, but in the course of six or eight weeks it began gradually to shrink up, until the condition of the child is now very good, with an average size canal.

Dr. Beck said that he had been very much more satisfied with his results in mastoid operations since he took a little trip to the Ethnical and Surgical Work Shop, as it is called by Dr. Bryant, the president of the American Medical Association, and there he learned a few surgical principles that have helped him in mastoid work. He took the liberty of presenting them. In the first place he had always had trouble with the granulation. Such conditions, he believed, were due to the constant disturbing of the wound. Since he has taken care that there has been less disturbance of the wound he has had less trouble with granulations. As a result he gets early epidermatization of the cavities.

Another little trick he learned there was in connection with the cigarette drain, or rather not using the cigarette drain, but what they call the split rubber tube. This is a rubber tubing which is prepared in the following manner: A pair of scissors are introduced into the tube, the size depending on the size of the cavity. Then cut to the top in a spiral manner until the whole tube is slit in the length desired. Having cut the tube in that manner straighten it out, and when it is closed up it returns to its original shape. Into this tube a slip of gauze is introduced and that makes an ideal drain which gives capillary, not collapsible, drainage, collapsible drainage being an objection to drainage with gauze. It gives also a multiple of drainage points along the course of the cut. There is not a stoppage of the tube as there usually is with perforations getting granulations into them. Again, there is a chance to remove every strip of gauze and reintroduce it without removing the tube.

Another point he wished to mention in connection with healing in chronic as well as acute cases, was to unite the wound, even in acute cases. Unite the incision completely, and make a separate incision further away from the wound in the most dependent part and drain through that, and permit the original wound to heal by primary union. The Mayo brothers unite wounds even in suppurative cases, and drain at another point. The point of advantage is this: They do not obtain any large stitch abscesses; they get a nice union, and much more rapid recovery. Another point: Beck said that he does not use interrupted sutures, but a silkworm subdermal suture. Those things, with the avoidance of constant washing, help in these cases.

Dr. S. H. LARGE, Cleveland, Ohio, said that as to blood-clot the surgeons as a rule try to get a perfectly dry wound in all parts of the body. the meninges are open he thinks it hardly safe to close the posterior wound entirely. As to the first dressing, it has been his rule not to touch the dressing until the seventh day, unless some unfavorable symptoms arise. The tube he saw one of the surgeons use in London last winter

was a common tube with perforations, and the surgeon in question reported

forty cases of its use with very good results.

Dr. Percy Fridenberg, New York City, said that any method which will shorten the convalescence of radical mastoid operations will be welcome. but he does not think that as yet such a method has been found in the blood-clot dressing, at least, in its present state. From a theoretical point of view the contaminating ability of a blood-clot has been broad enough. In fact, it is the best possible culture medium. Dr. Stucky mentioned the fact that it is not always possible to determine when the mastoid wound is clean. From a practical point of view Dr. Fridenberg thinks that results, however favorable they seem, must be compared with results produced in other regions by healing by first intention. As all know, the methods in general surgery are at present so perfect that a failure in a single case to get a healing by primal intention in an uninfected wound is considered a reproach to the surgeon, and a sufficient reason for a very rigid examination of his assistants to find out where that infection came from which caused failure. In the use of the blood-clot method a certain percentage of breaking down must be reckoned with, and it is never known beforehand in what case that breaking down is going to occur. Dr. Fridenberg considers that a procedure in which this possibility is always to be kept in mind is not a safe procedure, and that it is not an advance. The fact that drains, rubber tubes or different powders have to be resorted to in the treatment of an open cavity is also not a step in advance.

A prominent surgeon in New York recently told him that the blood-clot dressing has also been tried in other parts of the body where the surgeon had to deal with practically the same sort of problem, i. e., bone abseess, which could not be cleaned out thoroughly. The general surgeons have given up the blood-clot method entirely. The modification which they now use, and for which Dr. Fridenberg thinks there is a promising field in otology, is substantially, the use of an antiseptic soft filling of iodoform wax as suggested by Dr. Moorhof, the German surgeon, and used by him in a great many cases. The mixture can be applied at body heat, and after thorough cleansing of the bone cavity is filled in to the level of the soft tissues. In the ordinary packing the gauze becomes partially saturated, and no one can tell how many bacteria are latent in the tissues around the diseased muscles, and not only in the muscles, but in the periosteum and those portions of the bone which may not be accessible with curettes. Within a day or two after the operation there will be enough secretion to moisten the gauze slightly, and if those secretions contain but one or two colonies of bacteria to the cubic millimeter there will be enough to infect the whole clot. It seems that a distinction must be made between the chronic cases and the acute cases, and he certainly thinks that in acute cases the blood-clot will be superseded by the old method.

Dr. William Lincoln Ballenger, Chicago, said that Dr. Beck called his attention to a spiral drainage tube, and he had used it in all his mastoid cases since last February. He had had most gratifying results, as it contributes to the epidermization of the bony wound, and does not tear the granulating surface as the gauze dressing does. He has not used the blood-clot dressing and is not in a position to judge it. But this method requires, first of all, that the wound be made absolutely dry. It is presumed, of course, that all are complete operations, the radical in chronic cases, and the "complete" in acute cases. That is, after a complete removal of all the diseased tissue the wound is rendered as dry as possible, and the tubular dressing as used by the Mayo Brothers of Rochester is introduced. If the case is a radical operation the deep anchor stitches with heavy sutures is utilized for fixing the flaps in position, and he has found in all of the cases that the time of healing has been reduced very

much as compared with the time occupied by former methods, that is, the packing method. He had a radical case that was absolutely dry in two weeks; another radical case was absolutely dry in three weeks, and others in longer time. His impression is that the tubular drain is a most excellent device without any packing whatever. The advantages are, (a) it can be removed without disturbing the granulations of healing; (b) it can be removed without any pain to the patient; (c) a fresh one can be introduced without any discomfort to the patient.

DR. STUCKY asked what size of tube Dr. Ballenger uses; if he used one as large as can be gotten in to the canal?

DR. BALLENGER said he uses a tube about a quarter inch.

Dr. Stucky: You do not endeavor, then, to fill the canal with the tube?

DR. BALLANGER: Yes.

DR. STUCKY: The ordinary rubber tube?

Dr. Ballenger said that he uses the ordinary catheter rubber tubing. It must be stiff tubing. As to irrigation, he believes that irrigation should be avoided after operations. In abdominal surgery, as in rupture or appendicitis, the best method is to simply open the wound and introduce one or two cigarette drains or the spiral tube drain, and leave the case without irrigation. Dr. J. B. Murphy has performed thirty-seven operations on perforated appendices with this method of dressing and no irrigations, without a death. Under the older methods the death rate was high. If the same principle were applied to mastoid surgery Dr. Ballenger thought that better results would be obtained. During the last year he has not resorted to irrigation at any time during the operation, or in the subsequent treatment, and has had the most gratifying results. He has never yet removed one of these tubes and found that there was a condition of suppuration within the cavity. All was absolutely clean except as to the mucous secretion, and he recommended it, as Dr. Beck did, as an excellent method of postoperative treatment of mastoiditis.

Dr. Holinger, Chicago, spoke on the question of secondary necrosis He said that it can not be eliminated under any circumstances. There is no way to ascertain at the time of the operation whether certain parts of the bone will recover, and are in a healthy state, or whether they will be exfoliated secondarily sometimes a long time afterward. By allowing such a case to close under the blood-clot a solid scar results on the top, and an apparent cure for weeks. Later on necrosis starts a new abscess, and if it concerns the internal plate there is no possible means from the outside of recognizing it. The only possible exit of pus is through the dura. Another point he wished to mention was that in a convention two or more years ago, when he spoke of the time of recovery as being two weeks he was attacked by several who said such a thing was not possible. Since then it has become the rule more and more. But is it really an advantage to shorten still further the duration of healing? In the last few years more microscopic examinations have been made of the labyrinth and the nervous part of the ear. It was established that these parts are much oftener affected than is suspected, in all cases of diseases of the organism and certainly, too, in cases of acute and chronic suppurations of the middle ear. In all kinds of general affections of the organism it has been found that the different parts of the nerve show signs of degeneration, neuritis, etc. Now, certainly, a middle ear that has been suppurating for several days, or for several weeks, or for several months, can not be entirely without influence on the labyrinth on the nervous part of the ear, and the question is: Is it wise, is it good to let the patient get up after such a serious interference as a mastoid operation; is it good policy to let the patient get up and walk around after so short a time? Is it not much better policy

to give him a rest? Under all circumstances he is a sick person, even if only the after-effects of the narcosis be considered. He ought to stay in bed for at least a week if for no other reason than to let him get over the ill effects of the narcosis. Furthermore, let him have the rest that is so necessary for his nerves to recover their functions. The patient who, preceding the operation, went through days and nights of pain and sleeplessness, without proper nourishment, should be considered. What is the advantage of sending him back to work a week after the operation? He is not able to accomplish a full day's work. Comparing the possible dangers to the ear and the organism to the advantages, Dr. Holinger does not think that he will follow the doctor's example. Further, he does not operate every mastoid that is sensitive to pressure for a day or two, but when he operates he gives the patient time to recover fully.

Dr. Baker, Bay City, Mich., said that Dr. Stucky had touched on one question as to whether it can be known when there is a clean wound, so that it will be safe to close it with a blood-clot. He thought that Dr. Blake's original article answered that objection fully. It makes no difference whatever whether there is a clean wound or not in the use of the blood-clot. If the wound is infected there will be no primary union, and within a day or two it can be treated the same as if originally it had been known to be infected. That is the correct position to take. It makes no difference in the results. As regards the method of treatment with drains, Dr. Baker, seventeen years ago, began operating on mastoids and followed the accepted plans all the way through from the simple Wilde incision down to the most modern method, packing with dry packing, filling the whole cavity with iodoform gauze and keeping it up until the granulation has pushed the packing out from the bottom. He packed tightly at the time of the operation, but at the first dressing he did not put my packing in so tight, and at subsequent dressings he kept putting it in more loosely, and allowing granulation more opportunity to fill the cavity. The result was that usually on the third or fourth dressing he was able to remove the packing entirely, the wound closed up, and the time of convalescence, even in infected cases, was shortened very materially. The use of the split tube drain, he considers, is certainly a step in advance. Sometimes he packs with gauze in the first one or two dressings, and then, in order to get rid of the gauze he introduces the perforated tube with a great many perforations along the side, which amounts to the same thing as the spiral split tube, and he thinks the tube has some advantages which plain gauze will not have; a little better drainage is obtained. So far as irrigation is concerned, he never does it, even with peroxid of hydrogen. He has learned early that infection can be carried by irrigation into portions of the cavity that are not already infected.

Dr. Dundas Grant, London, Eng., said he was very fortunate in having listened to this discussion because he had picked up certain points he would certainly apply. In the prolonged treatment of radical mastoid operations there are fluctuations. Sometimes a plan presents itself which it is thought will cure all cases with great certainty and great rapidity, but failures accompanying its application bring disappointment. Dr. Grant is coming very rapidly to the opinion, which had been general in the discussion, that results are bad in proportion to the amount that is done in the way of manipulation, and the great thing is to try not to do too much. For instance, there is a tendency to the use of too strong antiseptics, and he had been much impressed with what Dr. Stucky said with regard to the use of alcohol. The use of alcohol in the ear is a most important medication, but it has been used too strong, and he therefore agreed with what Dr. Stucky suggested, viz., beginning with a weak solution of 5 per cent only, and gradually strengthening it. Recalling the very first radical

mastoid operation he had, certainly more than twenty years ago, when hardly anyone else was doing them in London, and he was fishing about to work out a method of doing it, some of the results were extraordinarily good as compared to what was afterward done with the tight packing, and the tight packing undoubtedly has been a source of trouble. That he has certainly given up. In a mild sort of way he tried the method of insufflating with boracic acid, which the Belgium profession has found so very excellent. It amounts as nearly as possible to the doing of nothing, which was then being advocated, and gives very good results. There is a great deal in what Dr. Ballenger said about being careful to keep the patient at rest. Dr. Grant said that he certainly keeps them absolutely still in bed for a week, and if that period could be prolonged it would be better for the patient.

Dr. Percy Fridenberg, New York City, in opposition to Dr. Baker, contended that in mastoid operations it does make a great difference whether the wound is perfectly clean or not. That point was brought out in the general discussion of the subject before the American Medical Association this spring. The difference is this: In the one case there is pus with a drainage, and in the other there is pus under pressure, which makes a great difference.

Dr. W. Sohier Bryant, New York City, said a question had been asked about the management of the meatal flap. In some of his cases the flap was cut in an ordinary way. Some had the flap sutured and some not. The results were identical. In some of the cases the membranous meatus was not incised and no flap was cut.

DR. STUCKY: What do you suture with?

DR. BRYANT: With chromicized catgut.

DR. STUCKY: What do you mean by the flap not being cut?

Dr. Bryant said that the meatus is left intact as it is separated from the bony wall. The metallic suture clamps for closure of the skin wound after the mastoid operation are very good. The results are the same from the subcutaneous suture. He uses them both. The metal claws are easier of application but slower of removal.

One speaker referred to the use of the tubal drain. At the Massachusetts Eye and Ear Infirmary in 1887 the regular treatment was closure of the mastoid wound round a rubber tube drain. This is what he advocates—no packing. In those early days the drain was left in too long and the bony excavation was not extensive enough to allow primary union by blood-clot as is now the case. Syringing should be left for the last resort in cleaning a foul wound.

Dr. Fridenberg mentioned the danger of closing the wound in case of infection. In the cases of infection which Dr. Bryant has had, after closure of the mastoid wound, he has seen no untoward results. These wounds have opened spontaneously and have drained freely. No packing was inserted and the wounds were allowed to remain open. As soon as any slough which may have formed comes away the wounds closed spontaneously. It should be borne in mind that the wound must not be closed in the first place unless all the diseased tissue has been removed.

Dr. Stucky: Will you tell us the size of the canals, whether you have any contracted ones?

Dr. Bryant: I have never had any contracted canals. I attribute this to the freedom from packing. My experience in handling mastoids has led me to think that the contraction is due to prolonged irritation of the canal. The method under discussion causes no irritation and the canal stays about normal size.

DR. DE VILBIS: I do not quite understand what Dr. Bryant means by not making the incision in the skin canal, after the radical mastoid

operation; how he treats that; what he does with it.

DR. BRYANT: Pack the canal, not too firmly, and distend it to its normal caliber. The packing should be removed every day and left out altogether when the attachment of the membranous canal commences to be firm, in from five to ten days.

Dr. De Vilbis: You close your wound at every point?

DR. BRYANT: Yes.

Dr. DE VILBIS: Do you not slit the canal?

Dr. Bryant said that in some cases he does not, and has found that these cases give the best results. During convalescence the canal will be swollen and its attachment may loosen a little, causing a temporary narrowing of the canal. This will disappear as the attachment becomes stronger and contract in cicatrization. The final result is a canal larger than the normal. Referring to Dr. Ballenger's remarks about the danger of too rapid healing, too rapid convalescence, Dr. Bryant said he agreed entirely with Dr. Ballenger as to the danger of letting the patient up and out of bed too early. The patient should not be let out of bed until the temperature is normal and the wound doing well. The advantage of rapid convalescence, however, as far as local conditions are concerned, cannot be overestimated, because the records of the cases show that the more rapid the healing the better will be the resultant hearing, and the less the likelihood of recurrent suppuration.

THE IMPORTANCE OF AN EARLY DIAGNOSIS OF MALIGNANCY OF THE LARYNX.

OTTO J. STEIN, M.D. CHICAGO.

My remarks are not intended as a contribution of anything new, but merely the expressions of an humble worker and observer in the field of laryngology, who seeks for a unification of opinion upon a method of procedure in case of malignant growths of the interior of the larynx, as well as to emphasize the necessity for their early recognition.

At the present time there exists a curious anomaly of opinion within the laryngological world relative to the mode of procedure in the presence of an intralaryngeal malignancy; and some of these contentions are at such a variance with the usually accepted pathology of this disease that one wonders how they obtain.

In the light of our present knowledge and the early diagnosis, early radical removal of a cancer is the most successful means we have at our command to determine a cure. This truism applies to cancer of the larvnx as elsewhere.

Ever since the discovery of the anesthetizing effects of cocain, it has been the effort of laryngology to instruct in the endolaryngeal route for removal of all neoplasms situated within the larynx. This method of teaching applied to malignant as well as to benign growths and was fostered by the belief that all neoplasms of the interior of the larvnx were accessible by the natural passage, and owing to scant lymphatic connections and a limiting cartilaginous band, all offensive neoplasms within the larynx remained confined for a protracted period. To-day the question is asked: Is it true that all neoplasms of the interior of the larvnx are accessible endolarvngeally? The experiences of the past twenty-five years do not prove the assertion. In making this statement one can not be disregardful of the admirable skill and ingenuity exhibited by many of our brilliant larvngologists in the removal of malignant tissue from the larvnx; and there undoubtedly exist isolated cases where the entire growth has been removed and no recurrence has taken place or complications set in. But they constitute by far the minority of the cases operated upon by this method. The conscientious worker in this field of laryngology, the man who is a close observer and who follows all cases coming under his observation throughout their course, can show that recurrences are common after endolarvngeal removal, which is mainly due to an inability to at all times appreciate the extent of the lesion by mirror examination alone, and as a result the operation is incomplete. It has repeatedly been shown on opening a larvnx that the malignant process involved a much greater extent of tissue than appeared from a study of the case with the mirror. In order that laryngology may maintain a position in the front rank of practical surgery, much of the teaching and practice as outlined in the standard text books on this subject must be rewritten. The experiences of some surgeons who have had large amounts of material to work with and who are students of this art and close observers, disclose many remarkable revelations in the results obtained by early and radical removal of involved tissue by the external method of operating.

The endolaryngists who, in view of our present knowledge, keep themselves so closely confined within the border lines of conservatism by maintaining that malignant processes within the Jarynx should be removed by way of the mouth, are not subserving the best interests of their patients, and are directing the newer generation of workers in a field that is fast casting an opprobrium upon the treatment of the laryngeal cancer.

It is primordial of surgical pathology that when an attempt is made to remove a malignant growth, one should circumscribe all morbid tissue by invading the surrounding healthy tissue and remove any enlarged neighboring lymphatic glands. This can be done with greater certainty and thoroughness by the external route. That it can not always be done endolaryngeally must be admitted by every fair-minded laryngologist. If reliable statistics of all cases operated on endolaryngeally could be obtained, I doubt if they would make even as good a showing as the thirty-two cases by Sendziak, in which there were 40.7 per cent. known relapses and 34.3 per cent. not accounted for. Then why, in the face of this axiomatic truth, should any one persist in the effort to remove malignant tissue from within the larynx by any other than the external route, when there is such uncertainty of reaching it all, and where there is a decided likelihood of a recurrence, usually in an aggravated form.

Krishaber's classification of malignant growths of the larvnx is a useful one in influencing the selection of operative procedure. He designated those tumors originating from the true and the false cords, the ventricle and the subglottic space as "intrinsic," and those originating from the interarvtenoid space, the esophegeal side of the larvnx, the epiglottis and the arvepiglottic fold as "extrinsic." Malignant tumors of the latter variety have associated an early and extensive involvement of the neighboring lymphatics, and on this account more frequently present metastases, and they also require more extensive radical operative procedure than the "intrinsic" variety, in which the disease at the beginning remains a local one, owing to its location within a cartilaginous box, from which the intrinsic lymphatics have a poor connection with the neighboring glands in the neck. Because of the local character of all purely intrinsic malignant tumors at the beginning, a most excellent prognosis can be entertained when immediate and complete removal of the growth is proceeded with by way of a thyrotomy. Where secondaries have already occurred by way of the lymphatics or by direct continuity, then the operation should be carried on to hemi or complete larvngectomy, with removal of all neighboring glands, whether involved or not. But wherever these secondaries have occurred or the disease is primarily of the "intrinsic" variety, the prognosis becomes much graver and the likelihood of recurrence much greater.

Of the various external methods of operating, that of thyrotomy is the simplest and most satisfactory if it is confined to the early cases, while the disease is still local and especially unilateral, and with no involvement of the underlying cartilage. Otherwise, partial or complete laryngectomy, as occasion may require, should be proceeded with at once. A perfect understanding with the patient as to this should be had prior to the operation, for it involves a medico-legal aspect in which a surgeon may be held liable for ven-

turing to do what was not anticipated or that was not presented to the patient as a possibility.

Aside from the partial and complete laryngectomies, the subhyoid pharyngotomy after Kocher is at times performed, but it is not an operation suitable for any of the intrinsic variety, for frequently there is present subglottic involvement that can not be seen or removed in this matter, and therefore the operation should be rejected as one of election. Von Billroth operated on a case in which the incision was made transversely in the upper third of the thyroid cartilage, admitting direct inspection of the ventricle; but I can not see any advantage in this method, while it possesses the same disadvantages that the subhyoid pharyngotomy does.

That many of the cases of intrinsic cancer are favorable for thyrotomy is nicely shown by the figures of Sendziak, in which the location of the disease was on the true or false cords in 130 out of 486 cases.

Several earnest workers have appeared in this particular field of laryngology, including Bruns, Mure, Butlin, Semon, Jackson, etc. But one of the most prolific and infectious writers on the subject is Sir Felix Semon. In one of his communications on this subject (the Seventy-first Annual Meeting of the British Medical Association, 1903) he showed out of 18 thyrotomies performed for early intrinsic malignancy of the larvnx, microscopic verifications having been made in all cases, 15 to 85 per cent, were cured. A year later, in an address delivered before the New York Academy of Medicine, he refers to 20 thyrotomies performed and 17 lasting cures. In a conversation with him during my visit to London this summer, he related that the number of these cases had been doubled, and that the percentage of cures still remained at 85 per cent. I think we will search in vain the entire domain of surgical statistics to find the parallel of these wonderful results for any malignant condition. In order to secure these "perfectly ideal" results, Semon considers the following conditions essential:

"The operation must be restricted to early stages of intrinsic malignant disease.

"For this purpose an early diagnosis is indispensable.

"The operation must be thorough; removing a sufficient area of healthy tissue around the growth."

Should the larynx when opened disclose the disease more extensive and advanced than supposed, such operative procedure should be indulged in to entirely eradicate all evidences of the disease, even if a partial or complete laryngectomy must be performed.

From this it is to be seen that it is in the very early stage of an intrinsic malignant process that the great benefit from any operative treatment is to be obtained.

The disease, once well established, precludes almost every chance of saving such a patient's life, while on the contrary, if recognized and operated on at the very beginning, almost every such life can be saved. The key note to the situation then is early recognition and the education of the public mind to early radical removal.

Larvngeal cancer has its ideal like many other things, but if we are to wait for the development of this ideal, it will be too late to do anything in the way of curative treatment. The diagnosis, if it be of any value to the patient, must be made early, and this requires a careful study of all suspicious larvngeal cases. Because there is an absence of the well-defined symptoms as seen in the advanced cases, or extensively involved areas, is no reason why one should surrender their watchfulness. Just because the patient manifests no characteristic cachexia or has no dyspnea or fetid breath, bloodstained expectorate or even hemorrhages, or pain referred to the ears, particularly on swallowing, does not justify one in dismissing the consideration of the possibility of a malignancy. To wait for these classical symptoms—these text-book symptoms, is to throw away, in many cases, the last hope of saving one's patient. Where the condition has progressed to such an extent as to cause glandular involvement, enlargement of the neck and emaciation, it has passed the confines of curability by means of thyrotomy.

In a careful perusal of the history of a great number of recorded cases of larvngeal cancer, one can not help but be impressed by the almost invariable presence of hoarseness as the earliest noticeable symptom. But on account of the frequency of hoarseness as a symptom of many varieties of laryngeal disease, its insignificance is liable to suffer for want of absolute recognition until all too late, and as a result the comfort, the happiness, the health and finally the life of the patient is sacrificed. But if we will take what material we have on hand in such cases and commence a series of thorough and painstaking search for a cause, we will arrive at a correct diagnosis much earlier than if we dismiss the case for want of sufficient evidence, or by treating it for a "cold," or just a "chronic hoarseness." The diagnosis of a case of chronic hoarseness necessitates a differentiation from a possible variety of conditions. Particularly is this true where no distinct lesion or growth is to be seen. The hoarseness, the result of a beginning malignancy, may in one case result from incomplete apposition of the vocal cords on phonation, owing to the situation of a neoplasm or infiltrate along the margin. In another case it may result from the infiltration impeding the motion of the cord, so that it can not approach sufficiently near its fellow. Still in another case the cord may meet its fellow and even approximate along its margin, but owing to the thickening, it is robbed of its finer vibration. In a few of the early cases, deep-seated growths or enlarged glands may inhibit the action of the cord by pressure on the recurrent nerve. Every case of chronic hoarseness for which no definite cause can be determined, should be placed under the closest surveillance and subjected to repeated examination at frequent intervals, at the same time, enlisting the confidence and support of the patient in every way possible.

One of the strongest clinical evidences of malignant involvement I have found to be infiltration. An infiltration that persists without an apparent reason I consider suspicious and advise careful observation of the same. The infiltration is not pathognomonic, nor has it any characteristic appearance. Most of those that have came under my eyes have had the appearance of being firm in consistency; but this does not at all times obtain, for there are varieties of malignancy that are soft or succulent-like, resembling much a turgescence. Many of these infiltrations have no sharp line of demarkation but blend imperceptibly with the surrounding structures. Their overlying mucous membrane may or may not be changed in appearance, depending much upon the starting point of the disease, the variety of the malignancy, its rapidity of growth, the age and general condition of the patient. At times the infiltration originates so deeply or in recesses like the ventricle, or is hidden from observation by the cords, that its early recognition becomes impossible, but on account of the pressure it may exert upon a branch of the motor nerve, or by direct encroachment upon intrinsic muscles, there is seen a lazy action of the vocal cord. This sign of "lagging" on the part of a cord during an attempt at phonation, when associated with chronic hoarseness, should always arouse suspicion and awaken watchfulness. Gerhardt considers a chronic hoarseness in middle or old age, and without cough, as suspicious.

The color of these neoplasms varies so, according to their variety and other conditions, that no characteristic description can be given. The opaque or chalk-white kind are more characteristic of the epithelial variety found on the vocal cords. The reddish or yellowish ones on the vocal cords are frequently of the diffuse variety. The grayish color is often the accompaniment of the diffuse cauliflower form that arises from the bands, the ventricle, or wall of the larynx. The color of the sarcomas is more commonly of light yellowish and

smooth of surface. Fraenkel's classification of carcinoma of the larynx as modified by Moritz Schmidt, is an excellent guide to a clear understanding of the various varieties. The first is the polypoid form on the vocal cord, often resembling a fibroma. The second is the diffuse form on the vocal cords, presenting a thickened, irregular or nodular surface. The third is either of the above forms or a combination of the two, situated elsewhere than on the vocal cords, and resembles more often a cauliflower-like growth. The fourth is the ventricular form. The fifth is that form that originates deep seated.

The diagnosis embraces at times the consideration of tuberculosis and syphilis of the larvnx, chronic larvngitis, pachyderma laryngis, various benign growths, gouty deposits and laryngeal paralysis. In my experience the presence of a tubercular lesion of the larvnx has more often made the diagnosis difficult and uncertain. In a large number of cases physical evidence of the disease elsewhere is of great aid in deciding the character of the trouble. But the absence of a slight temperature, a loss of weight or a negative T.B. examination is no proof that we may not have a tubercular lesion to deal with. I had a patient who died last year of tuberculosis at the age of 55, who was four years under my care, and at the very beginning of his trouble, which consisted merely of a hoarseness from a one-sided ulceration of the cord, he had no physical evidences of tuberculosis, no temperature, no loss of weight, no T.B.'s, no lung involvement, and he remained free from any such evidences for almost three years, but the progress of the larvngeal disease was typical of tuberculosis.

The gumma of syphilis is the variety of this disease that may confuse the diagnosis for a time. But here the development is rapid. It appears suddenly and progresses rapidly to a breaking-down and great destruction. Evidences of the disease are commonly found elsewhere. The history may be of assistance, but in my experience has proven of little value, as I have found very little veracity on this subject in those afflicted with this disease. Administration of the customary antisyphilitic remedies as a rule clears the horizon of any doubt, although one must remember the beneficial effect of this kind of treatment on some of the malignant diseases.

Chronic laryngitis presents a bilateral hyperemia and infiltration in differentiation to the usual unilateral character of malignancy. Pachyderma laryngis is a symmetrical affection located upon the vocal processes, an unusual site for a malignancy. The benign growths, as a rule, have no infiltration like the malignant ones and they grow toward the lumen in place of into the tissues as the latter do.

There are forms of malignancy that at times present great difficulty in diagnosis, as, for instance, a cancer may take its origin deep in the tissues, and by its enroachment on the mucous membrane, present a vegetating mass of proliferating tissue that has the appearances of a papilloma. Or a round smooth mass situated in the ventricle of Morgagni may look like a perichondritis. Or there may be a paralysis present, the result of a small malignant mass situated below the cords. A few of the obscure cases no doubt are the result of the presence of two different diseases, like cancer and syphilis or cancer and tuberculosis, resulting in an atypical presentation. Confusion may also result from the appearances of a malignancy in a patient formerly known to have had tuberculosis or syphilis, as related by von Zencker and Schmidt.

Where a careful and systematic study of a case with the aid of a laryngoscope admits of doubt as to the true diagnosis, the aid of a microscope may be employed with benefit, although its findings are not always to be relied upon as conclusive. It is not uncommon to find a malignancy that presents the appearances of a papilloma, both clinically and microscopically, and unless the piece of tumor removed be very large and deep, the microscopic findings may prove misleading. The case reported by Knight of a supposed vocal nodule proving to be an epithelioma, and that of Sakolowski, where a supposed polyp proved to be an adeno-carcinoma, and also Ward's case of primary papilloma resulting in the appearance of an adeno-carcinoma, show the possibility of such error. In Keen's case, only the papillomatous surface was at first examined, while deep down the true carcinomatous nature was revealed.

I can not help but believe that were these cases of chronic hoarseness more carefully followed and watched, there would be less need for our depending on the microscope. It is true that the microscopic finding in many cases has been unsatisfactory and at times misleading, but this has been due almost as frequently to insufficient removal of tissue or incompetent examination of the same. When the first is sufficient and the latter trustworthy, the information should always be of great value; but a negative finding in a case clinically suspicious, or a suspicious case that can not be disproved should not, after explaining the matter to the patient, deter one from performing a thyrotomy, even though it be but exploratory. Carefully and skillfully performed, there can follow no harm.

Before any tissue is removed for microscopic purposes, the

patient must be placed in full possession of the possibility of affairs, so that immediate radical measures may be undertaken for its removal by the external route.

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DISCUSSION.

Dr. Dundas Grant, London, Eng., said that there is no question but Dr. Stein has made a very good case in support of his contention that a diagnosis cannot be made too early. The best example of that is certainly his experience, which so far has not been equaled by those of anyone else, and there seems no reason to suppose there has been any error of diagnosis in any of these cases, though perhaps he has placed rather a short period as a time after which he considers a complete cure has been effected. There is probably no time beyond which it is too long for recurrence to take place, and some recurrences have been after several years of apparent immunity. With regard to early diagnosis, of course, the microscope has to be the stand-by, but before anything is removed for examination it is best to have patient's permission to operate at once if it turns out to be a malignant case. Otherwise it is best to leave the case alone, because the removal can only wake up and start it off with rapidity, in case it is going on ordinarily well. More than one instance of this has been seen.

With regard to the instrument for removing portions, Dr. Grant thought his own safety pharyngeal forceps one of the best, for it can only cut off anything that is really projecting from the vocal cord, though it may not remove sufficient to make sure as to the deeper part of the growth. In that case one of the best instruments he knows is Marsh's, a sort of penknife, which gets under the vocal cord and will cut out a very considerable mass. There are four blades to it, one for the right, one for the left side, one for the anterior column and one for the posterior. But it is a very greedy instrument. On one occasion in which it was desirable to make a diagnosis

perfectly sure, Dr. Grant used it and it removed such a large mass of the vocal cord that the patient's voice was very seriously damaged; it was very much weaker than it was before. But he had a reward for it, and that was the accurate and posititive assurance from the examination of this large mass that it was not malignant. It illustrated how thorough the instrument was, though Dr. Grant was a little bit disconcerted at having really, with the best intentions, damaged the patient's voice, when if one could have told beforehand it was non-malignant, of course, the voice might still have remained more useful.

With regard to thyrotomy, as long as the suspected growth is not exactly in the median line anteriorly. Dr. Grant said that the thyrotomy might very reasonably be practiced for purposes of exploration, without necessarily being followed by the complete operation. When the patient's permission for operation is sought it should extend to the complete removal of the larynx if that should prove to be necessary. That is to say, if on opening the larynx it is found that it is bilateral and extends well into the cartilage beyond, the prognosis of the complete operation is really better than that of hemi-laryngectomy. Dr. Grant has himself done two cases of complete removal and both patients got through the operation perfectly well. One lived for nearly a vear when she died of a recurrence in the neighborhood. The other, a man, is still alive, although it is now more than a year and a half since the operation, and he is better.

Dr. MAYER, New York City: I would like to ask Dr. Grant if he has seen any cases of cancer of the larynx that were operable and operation was refused; if so, whether he can recall the length of time the patient lived without operation?

Dr. Grant: I have at least one case in which tracheotomy was performed on account of impending suffocation, and from the time of the tracheotomy the patient lived for three and a half years. I would not place that as the average. I think that was a remarkable case, but it shows what can take place.

Dr. Miner, Detroit, Mich.: I would like to ask Dr. Grant if in making or performing laryngectomy he usually makes tracheotomy?

Dr. Grant: Yes. So far as my present experience has gone that is very desirable, and I think it is very desirable even afterward to leave the tracheotomy wound open, keeping in the tracheotomy tube itself for twenty-four hours. At all events leave the tracheotomy wound open. We now make it a rule to sew up the thyroid after thyrotomy, but by leaving the tracheotomy wound open a little the patient can cough, and then there is a greater chance of avoiding septicemia.

Dr. Ballenger. Chicago, said that with a patient 40 years of age, with history of chronic hoarseness without cough, although cough may be present, suspicion of cancer of the larynx is justifiable. It is not always present, however. This was well illustrated in a case which recently came to his knowledge. On inspection of the larynx he found a tumorous mass on one side, and a fixation of the cord. The mass was nodular in outline, and impressed him as carcinoma. He attempted to get a small piece for microscopical inspection without taking the wise precaution that Dr. Grant mentioned, that he should have been prepared to proceed at once with the operation if it should prove malignant. He failed to get the piece of tissue, but succeeded in opening a chronic perchondrial abscess. The swelling went down, although the fixation remains, but the hoarseness has not been improved. Perichondritis, therefore, may need to be differentiated occasionally from carcinoma of the larynx. This case was at first sight as typical of carcinoma as any he had ever seen, and he has seen many. As to the necessity for tracheotomy in complete laryngectomy, Dr. Keen of Philadelphia has recommended, or suggested rather, that in his next operation he would perform complete laryngectomy without doing tracheotomy, either before the operation, as a preliminary step, or during the operation itself; but that he would proceed to loosen the larynx from its surrounding tissue, and then at the proper moment he would sever it from the trachea, and proceed to administer an anesthetic through the trachea, stitching it to the skin to prevent sinking when severed. Dr. Ballenger said that he himself did this one year ago with complete success.

Dr. Holinger, Chicago, reported a case in which he was suspicious of carcinoma and removed a piece of the side wall of the larynx, which was protruding considerably beyond the middle of the larynx, for microscopic examination. The answer of the pathologist was, non-malignant papilloma. The larynx was removed because he depended more on the clinical symptoms than on the pathologic diagnosis. A second examination from the excised larvnx showed carcinoma.

Dr. Levy, Denver, said that one of the earliest symptoms of laryngeal tuberculosis which Dr. Stein has mentioned is a paretic condition of the vocal bands. This sign is of great importance and he believes it is frequently overlooked. One of the earliest symptoms of cancer of the larynx having no reference to vocal involvement is respiratory embarrassment. Slight difficulty in breathing with very moderate stridor manifesting itself only on exertion should be looked on as extremely significant. This condition is due to malignant infiltration of the muscles and submucous structures before external manifestations present themselves.

Dr. Edward C. Ellett, Memphis, Tenn., mentioned two similar cases that had come under his observation that have a bearing on some of the features that Dr. Levy brought out. The patients were both young men in the neighborhood of thirty, or between thirty and forty, both presenting tumors in the nose, which had sufficient clinical characteristics to make them suspicious. No specific history was obtainable in either case. Portions of the growth were removed in both cases, and submitted to a competent pathologist, the same pathologist in both cases, and the diagnosis of sarcoma was returned in both cases.

Dr. Mayer said he would suppose that a man of the proper age, suspected of having malignant disease, presented himself for diagnosis. All of the points from a clinical point of view would point possibly to the question of the disease being of a malignant nature, and the patient is told: "We do not know what the nature of this is; your condition is the following; if this thing turns out to be malignant, on removal of a portion of the growth, you will be prepared to have an operation performed." In such a case suppose the patient concludes that he is going to take a chance and will not consent to have an operation performed, it will be interesting to note, how long does such a patient as that live, provided the diagnosis shows it to have been a malignant disease? From the statistics Dr. Mayer said it is known that in such cases a man might have thyrotomy performed, the growth removed, and would run probably the average, i. e., live four or five years. Would he live just as long without the operation? Dr. Mayer asked if Dr. Stein could throw any light on that.

Dr. Stein, referring to Dr. Grant's remarks, said that in the conclusion of his paper he touched on several of the points Dr. Grant mentioned, but on account of the time limit he did not reach them, particularly that part appertaining to the removal of tissue for diagnosis. He mentioned the importance of getting it out; the difficulty of getting at it; the unsatisfactory character of the instrument in getting out sufficient tissue or the proper kind of tissue for examination, and the incompleteness and the incompetency shown frequently, as Dr. Loeb mentions, on the part of the pathologist in determining exactly what the tissue is.

Another point spoken of and one that Dr. Grant mentions, was the ab-

solute necessity of demonstrating to the patient the importance of being prepared for an immediate operation in case any tissue is taken for examination which proves malignant. That point has been emphasized by men who have done a great deal of this work, and it is very important for the patient to know that when this tissue is taken out and found to be malignant an operation must be performed immediately and external operation at that.

Dr. Stein said that Dr. Mayer's question was the very question which prompted him to write the paper. His purpose was to determine how long such patients live. When a malignancy is suspected, tell them of the suspicion, and if they refuse operation, follow the course of the case and see how long they live, and what complications set in. He asked Dr. Mayer if that was the point.

Dr. MAYER: Exactly.

Dr. Stein said that he had followed out a few cases, but unfortunately, did not have time to get all of his reports in (he hoped to make it the subject of a future paper), so he had to change the title to "Some of the Manifestations for Early Diagnosis." He would not touch on the technic of the operation, and preliminary tracheotomy did not enter into his paper. Dr. Ballenger's suggestion of adding perichondritis to the list of conditions for differential diagnosis he hardly thought pertinent to the subject, but if so, it is included under the perichondritis associated with syphilis and tuberculosis, which is rather common. He had intended to mention in his paper that point brought out by Dr. Levy concerning a slight disturbance of the respiration. He frequently takes notice of it, but has great difficulty in getting any satisfaction out of it. Whenever he puts that question to suspected patients they frequently have a disturbance in respiration right away. The suggestion is enough, and almost invariably they say, Yes. So he has been led to feel that it is not so reliable, although it has been noted by laryngologists as a very important sign.

SARCOMA OF THE NOSE, WITH A CONSIDERATION OF THE SPONTANEOUS DISAPPEARANCE OF MALIGNANT GROWTHS.

ROBERT LEVY, M.D. DENVER, COLO.

Case 1.—On Nov. 15, 1903, Mrs. C., aged 73, mother of a physician, was first examined by me for the purpose of determining what, if anything, could be done to relieve her. She gave the following history: About March, 1903, symptoms of what appeared to the patient to be a cold presented themselves. There was slight catarrhal discharge and some difficulty in breathing, particularly through the right nostril. There was no pain and no bleeding from the nose, the discharge being of a muco-purulent character; at no time during the history of the case was there any nasal hemorrhage. The difficulty in breathing became more marked in April and was complete about Aug. 1, 1903, compelling the patient to breathe through the mouth. A mass completely filling the right nostril was discovered by the patient's son and a small piece removed and submitted for

microscopical examination to Dr. W. C. Mitchell of the Denver and Gross College of Medicine, who reported June 2 as follows:

"In reference to the examination of nasal tumor for Mrs. C., I beg to report as follows: The entire mass consists of small, round cells with little, if any, basement membrane discernable. Histological diagnosis, small round-celled sarcoma."

A number of physicians being consulted the case was pronounced inoperable and the patient placed upon a course of iodid of potash, continued over a period of two months. The result of this treatment was negative. From August 8 until September 4, the patient was given Cooley's erysipelas toxins, the result being also negative

My examination revealed a large, pale, nodular tumor filling the entire right nasal fossa, deforming the nose so that it was enlarged and flattened and deflecting the septum markedly to the left; tumor extended from the anterior to the posterior nares. There was no ulcerated surface to be seen and no evidence of hemorrhage. The left nostril seemed to be entirely free of involvement, being however, decidedly narrowed by the deflected septum. An unfavorable prognosis was given, especially in view of the very positive microscopic report, and a radical operation suggested as the only resort. Upon consultation with Dr. Freeman, it was decided that the case was entirely too discouraging to warrant surgical interference. On December 22, the patient again presented herself begging for at least some relief. I decided to remove enough of the growth by the intranasal route to relieve at least slightly and temporarily the nasal stenosis. The operation was performed in two sittings, December 22 and 29, by means of cold wire snare, galvano cautery snare, scissors and forceps. The bleeding was profuse but the tumor was found to be less adherent than anticipated and the right nostril was thoroughly cleared of all suspicious tissue. Several days later the galvano cautery was freely applied to the small projecting nodules in the roof and external wall of the nasal cavity. The patient now improved rapidly in general health, appearing finally entirely well. Nasal respiration was free on both sides, notwithstanding the deflected septum.

March 15, 1904, there developed slight difficulty in breathing on the left side of the nose. An examination revealed a smooth growth about the size and shape of a shelled almond, situated on the left side of the septum high up and in its anterior portion. There also developed about the same time metastatic growths on both legs. On the right there was one on the anterior and external surface below the knee, one on the anterior internal surface in the lower third of the leg, and two in the middle of the calf. On the

left leg there was one in the middle of the calf. These growths were purple in color, smooth, shiny, firm and round. From March 15 until May 25, x-ray treatment by Dr. Stover was conscientiously carried out, but resulted in no apparent improvement. The almond-shaped growth in the nose was then removed by scissors and knife and its surface thoroughly cauterized with the galvano cautery, which was repeated June 8. The secondary growth was again referred to Dr. Mitchell, who reported as follows:

"In reference to this examination of the nasal tumor of Mrs. C., I have to report the structure shows the identical cellular elements as the first mass with the exception of numerous blood vessels. No signs of breaking down."

The nasal symptoms now continued to increase in severity, the stenosis became more marked, and the nose swelled appreciably. Despairing of accomplishing anything further, the doctor was advised to make his mother as comfortable as possible and patiently await the final, fatal termination.

The patient was not again seen by me until April 12, 1905, almost a year since the last operation. At this time the following remarkable condition was found. Absolute and complete disappearance of all evidence of nasal trouble, free breathing, and no sign of a growth. A cicatrix was seen in the left nasal cavity at the site of former cauterizations, and a synechia extended from the septum to the roof of the nose. All but two of the growths upon the legs had disappeared, leaving a shiny, brownish discoloration. The two remaining were on each calf and were growing steadily, the one on the left calf measuring two inches and the one on the right one and one-half inches in diameter. In addition to this a small nodule had made its appearance upon the inner surface of the right leg, somewhat below the middle. This nodule was about the size of a small almond, the skin over it being as vet not discolored. Upon inquiry it was found that the patient had received absolutely no medical attention. The disappearance of the growths was entirely spontaneous. The diagnosis was now seriously questioned. Having learned several weeks before this examination of the progress the patient was making, a critical investigation into the diagnosis was instituted. The specimens were sent to Professor Welch at Johns Hopkins, whose report in full is here appended:

> Johns Hopkins University, Baltimore, March 13, 1905.

Examination.—The specimen consists of several good sized pieces of solid tissue, two or more centimeters in diameter, of irregular shape, but often with a smooth hemispherical surface. The

cut surface appears grayish and uniform. The microscopial sections show in places over the rounded surface epithelium, partly cylindrical and ciliated, partly squamous, like that of the nasal mucous membrane, but more commonly this free surface is ulcerated and presents a necrotic, fibrinoid aspect. The rest of the sections consist entirely of tumor, which is composed almost wholly of cells with scanty basement substance.

The cells are of the type of those of a small or medium sized round-celled sarcoma. Their nuclei are round or slightly oval, with distinct nuclear membrane and one or more nucleoli, or nucleolar-like bodies. Broken bits of chromatin or an imperfect chromatin-reticulum are present within the nuclear membrane. The protoplasm around these nuclei is in general so friable that it is recognizable with difficulty or not at all in most places, so that the nuclei appear naked, as is so often the case in sarcomata preserved in alcohol. Where the cell-body can be seen the cells appear to be round, oval or irregular, sometimes angular in shape, and are not very large. These cells, which constitute the great mass of the tumor, are crowded together without any definite arrangement or architecture. There is a scanty fibrillar or reticular intercellular substance which belongs to narrow fusiform cells of a fibroblastic type. These latter cells and fibrils make up the delicate supporting framework of the masses of round cells composing the tumor.

Blood vessels are seen in fair number. These, even when of large size, have thin walls which are immediately enveloped by the tumor cells. Some of the superficial veins contain fibrinous thrombi.

In some sections there is a layer of connective tissue between the covering epithelium and the tumor, in others the tumor reaches the free surface of the sections.

Diagnosis.—Small, round-celled sarcoma.

Remarks: The tumor probably originated in the lymphatic tissue of the nasal mucous membrane. It might also be designated a lympho-sarcoma, but this term has been used in so many different senses that the application is frequently misleading. The present tumor has not the feature of Hodgkin's disease, but resembles certain true sarcomata of lymphatic glands. It has the histological features of a rapidly growing, true, round-celled sarcoma, such as can originate not only in lymphatic tissue, but in any connective tissue of the body, and is likely to produce metastases.

The fact that the tumors ceased to grow and eventually disappeared is interesting and remarkable. There is nothing in the sections to point to syphilis as a cause of the tumors. Similar

tumors have been known to disappear, but I have no explanation to offer. Evidences of any regressive metamorphosis are not seen in the sections.

WILLIAM H. WELCH.

Professor Welch made the following personal communication:

March 13, 1905.

My Dear Doctor Levy:—I should regard the tumors as a true round-celled sarcoma and malignant, indeed as belonging to the type of the more malignant sarcomata, more malignant for example than the so-called spindle-celled sarcomata. But I know from experience that it is unsafe to make as positive a statement about the clinical course of sarcomata as about a carcinoma, and cases apparently alike may pursue quite different courses.

The fact that tumors with every microscopical appearance of malignant growths may spontaneously disappear is known, but it is so rare and the conditions for such disappearance so unknown, that such an observation as yours should be reported with the microscopical findings. This occurrence is more common with sarcomata of this general type than with other forms of tumor. Very sincerely yours,

WILLIAM H. WELCH.

Under date of Oct. 9, 1905, in complying with my request for a statement as to his mother, Dr. C. replied "that there are no signs of anything in the nose, but that the growths on her legs have grown quite rapidly, and that one of them is discharging freely. She is now hardly able to walk, and is failing rapidly." The return of these growths on the legs began about May, 1905, multiplying rapidly until twenty-five or thirty about the size of walnuts were found upon the knee and ankle. About July 1, 1905, these began to ulcerate. The patient was confined to her bed about Jan. 1, 1906, and died March 3, of exhaustion.

A postmortem examination of the legs was made by Dr. Harding of the pathological laboratory of the Denver and Gross College of Medicine. He reported as follows:

Right leg. one round nodule three inches in diameter, raised, hard, non-ulcerated over the inner side of the calf. Left leg, a line of seven nodules on the crest of the tibia extending from the tubercle to the malleoli. These were firm, non-ulcerated, and not movable over the bone. Ten similar nodules were scattered over the outer side. One nodule was situated over the inner head of the gastrocnemius and over the inner side a firm blue ulcerated mass three inches wide extended from two inches below the tubercle of the tibia to the internal malleoli. Microscopic examination of sections from a number of these nodules showed small, round-celled sarcoma.

The interest attached to the spontaneous disappearance of malignant growths becomes more intense as authentic cases in the literature multiply. The above case is presented in full detail, as should every case which deals with a question of such great importance, and one which may be subject to much doubt and criticism. From the evidence, however, in the above report, we must conclude:

- 1. That so far as our pathology can determine, the case was one of undoubted malignant growth.
- 2. That the nasal tumor completely and spontaneously disappeared.
- 3. That several metastatic growths completely and spontaneously disappeared.
 - 4. That several metastatic growths markedly retrogressed.

A careful search through the literature reveals reports of disappearing tumors of various characters. Those presenting characteristics of malignant growths are not numerous and particularly do we find the clinical diagnosis of malignant tumors without a convincing histological report. That the clinical evidence should not be considered as proof positive is admitted by all, but on the other hand the microscopic diagnosis may also be open to question. Commenting upon the cases of Senger, reported later, in which tumors exhibiting all the microscopic appearance of cancer disappeared, Freeman¹ states that Senger "agrees with Gussenbauer that they were probably not true sarcomata, the clinical evidence being perhaps more trustworthy than the microscopic in such cases."

It is, therefore, contended, first, that clinical and microscopic evidences should agree and be indisputable, and second, that one may accept the diagnosis of either clinician or pathologist, providing these are of recognized ability and authority.

CASES AND RECORDS.

J. Gregg Smith² reports three cases.

Case 2.—Patient, male, aged 25 years. Sent to hospital June 1, 1889. Intestinal obstruction. Solid tumor as large as cocoanut occupying left iliac region. Intestines adherent to it. Sarcoma was diagnosed. Intestinal evacuation and drainage. Enterostomy in lower ileum. Feces passed through artificial openings for two weeks, then began to appear per rectum. At end of six months artificial opening was closed. No tumor could be felt through the parietes and at time of operation the finger in incision felt only adhesions. Patient recovered, and after four and one-half years is well.

Trans. American Surg. Assn., vol. xviii, p. 302.
 Med. Chir. Trans., 1894, lxxvii, p. 139.

Case 3.—Widow, aged 50. Oct. 26, 1889, after gradually increasing weakness for some time, had first noticed swelling in abdomen (umbilical region), adherent to skin and movable with parietes. November 8, operation. Two drams of muco-pus lying under skin of umbilicus was evacuated. No sinus discovered. Tumor explored and by reason of adhesions, removal was not attempted. Growth believed to be cancerous, and hopeless prognosis given. Gradual loss of strength and flesh, sallow complexion, no pain, no elevation of temperature. Patient, however, began to improve. A sinus discharged pus for a year, ceased six months, and then returned. Healed finally. Patient seems entirely recovered.

Case 4.—Nursemaid, aged 19 years. Entered hospital Jan. 9, 1892, complaining of general weakness for six months past. Had noticed swelling on right side of abdomen, which gradually increased in size. Tumor solid and size of eight months' pregnant uterus. January 11 growth exposed by incision 4 in. in length. Adhesions between growth and parietes separated. All present believed growth malignant and as it adhered behind and at the top under the ribs, and with unremovable organs, operation was abandoned. January 19 wound began to gape and soon a fecal fistula formed, through which for three months all the feces passed, while the tumor gradually decreased. May 1 opening closed. May 6 wound was found quite healed. June 21 patient entirely well and has so continued.

Remarks.—The author, by a process of elimination, concludes that all three of these cases were malignant growths which spontaneously disappeared. The only authority for his diagnosis was the clinical appearance, the fact that upon section of Case 2 the mass presented a gray, glistening appearance similar to that of sarcoma, and the opinion of others present at the operation.

Barker³ reports a case of tumor which he believes to have been sarcoma situated under the angle of the right jaw. Upon operation tumor was so firmly attached to the transverse process of the vertebra that the operation was abandoned. Four years later the entire growth had disappeared.

G. M. Smith,⁴ after speaking of the very few reports of cases of spontaneous disappearance of sarcomatous tumors and the difficulty of making an exact diagnosis, reports the following case:

Case 5.—W. R. C., aged 52, gardener. Admitted to hospital in March, 1894. First noticed swelling at angle of right jaw in November. No syphilis, tubercle, or former lesion. Growth was

^{3.} Proc. Royal Med. Chir. Society, London, 1892-94, p. 44.

^{4.} Bristol Med. Chir. Journal, 1900, vol. xviii.

removed and found to be encapsulated, but firmly attached to masseter and other structures, 2 in. by 1 in diameter. Microscopically small round cells were the chief constituent, and there was little stroma. Wound healed. In August, 1895, readmitted because of smooth, firm, lobulated swelling involving parts behind and beneath the angle of jaw (right side), and extending downwards anterior to the sterno-mastoid. Slight pain. Considered a recurrence, and operation decided upon. Growth similar to former, but extended deeply into the neck and was adherent to the prevertebral muscles. It was found impossible to remove tumor. Wound plugged with gauze. Wound healed by granulation in three weeks. Patient left hospital for two or three weeks. On his return, tumor had decreased in size. Four and one-half months after operation there appeared no trace of the swelling, but there was a small, hard gland on opposite side of neck. In February, 1896, a circular ulcer appeared upon fauces and right tonsil. Treatment, iodid of potassium, which was of little avail. However, under no special treatment but rest in bed and antiseptic washes, the malignant looking ulcer disappeared. In July, 1896, patient was suffering with "round lump just beneath his left ear, firm, pigmented and increasing in size." Abdominal walls were tense from the presence of ascites. Edema of limbs and scrotum. Several subcutaneous nodules on arms and legs. Diagnosis of malignant growth made and the case seemed hopeless. In seven weeks' time edema began to disappear and gradually left an apparently healthy abdomen. Meanwhile lump on neck began to increase and in December it was as large as an orange, fungating, soft and dark reddish. Frequently bled from the foul cauliflower-like excrescences with which it was covered. Removal of this large superficial tumor. Its base was indurated and the deep structures of neck were involved. No attempt made to remove this. "Some attempts at healing took place." However, in groin, forearms and legs several lumps were present which presented all the appearance of sarcomatous deposits. Microscopical examination showed small, round cells with numerous blood vessels and very little stroma. The subcutaneous nodules rapidly developed in size and number. No postmortem.

Remarks.—The author believed that a primary lesion was a lymph-sarcoma at the angle of the jaw. After extirpation, it recurred, and after unsuccessful attempt at removal, spontaneously disappeared. The ulcer on tonsil and ascites seemed clearly malignant, yet recovery was made from both. Author, therefore, has the belief that from the microscopical examination, the clinical features and the termination by numerous pigmented tumors is

strong evidence in favor of "the whole cycle of events being malignant."

Dwight⁵ reports an apparently benign tumor, which disappeared, but mentions two cases of Sir James Paget. One multiple medullary sarcoma occurring on the neck and in the axilla. A large mass over one deltoid suppurated and sloughed, during which process the other growths disappeared. The man recovered and enjoyed good health for some time, but recurrence took place and the patient died. The other medullary cancer of an undescended testis. The tumor was very large and disappeared. Recurred four times before death resulted. Both cases were confirmed microscopically.

Bennett⁶ relates the following nine cases:

Case 6.—Female, aged 36. Tumor in abdomen right side immediately below liver. Mass gradually increased. Emaciation and cachexia. Abdomen opened and liver and omentum appeared to be involved. A portion was excised for microscopical examination and subsequently reported to be a typical specimen of mixed and spindle-celled sarcoma. No removal save as stated above, and prognosis considered grave. In eighteen months, however, tumor had vanished and patient was healthy.

CASE 7.—Female, aged 52 years. Melanotic sarcoma of the sole of the foot, which was excised. A few months later recurrence and amputation. Two months later, small blackish tumors appeared on thighs and increased to the number of 62. Microscopical examination showed them to be typical "round celled sarcoma without pigment." Consultation was held and no operation was decided upon. Six months later she presented but three nodules, and later was entirely healthy.

Case 8.—Another case almost identical with No. 7.

Case 9.—Male, 48 years. A tumor thought to be a hydrocele, had existed for nine years and unchanged in size for seven. Trocar inserted without result. Later, by means of large trocar and canula, some tissue was secured for examination. Diagnosis was sarcoma, confirmed by microscope. Castration postponed, and within six months growth had disappeared.

Case 10.—Another case, identical with No. 9, except that diagnosis was not confirmed by microscopical examination.

CASE 11.—In this and the following case, the diagnosis was made from clinical characteristics. Patient, middle-aged man. Emaciation and cachectic appearance. Abdominal section showed orange-sized mass involving pylorus, together with nodules in

^{5.} Boston Med. and Surg. Jour., December, 1880, p. 562.

^{6.} London Lancet, 1899, vol. i, p. 3.

omentum and around liver. Gastrojejunostomy performed. Rapid recovery from operation, and tumor after five years is imperceptible.

Case 12.—Female of middle age. Large tumor in lower part of neck. Sallow. Below the tumor on right side was a large glandular mass. Operation believed not be justified, but all physicians who made examination thought tumor malignant. A few months later, mass began to shrink and finally disappeared with consequent restoration of health.

CASE 13.—In this case an encephaloid carcinoma was removed from the testicle of a man 40 years of age. This was followed by a tumor being found near liver. Patient's condition grew gradually worse and fatal termination was thought inevitable. Disappearance within six months and restoration to health.

CASE 14.—Unmarried woman, 36 years of age, with scirrhous carcinoma of left mamma. Removal three years later, seemed to be involvement of right breast and consequent removal. Soon after second operation hard nodules appeared along scar of first operation wound, followed by others in the skin, which appeared typical. She paid no attention to these, and seems now healthy.

Remarks.—Of these nine cases, Cases 6 and 7 are open to question. The clinical characteristics were, however, distinctly conclusive.

D'Arcy Powers⁷ reports five vanishing tumors, three of which he believes to have been malignant:

CASE 15.—Male, aged 21 years. Tumor situated between umbilicus and pubes, size of a cocoanut. Could be felt per rectum. Incision was made through the linea alba, but tumor was too firmly attached to be removed. Incision was closed and patient left hospital with no noticeable decrease in its size. Three months later tumor had entirely disappeared. Author believes tumor to have been sarcomatous, basing belief on rapid growth, firm connection with pelvic bones, progressive loss of weight, and appearance of tumor at the exploratory incision.

CASE 16.—Male, aged 54 years. Emaciation. Tumor in abdomen, just below liver. Exploratory incision showed that on account of adhesions growth could not be removed. Four months later tumor had disappeared. Several months later, however, he died from jaundice, and autopsy showed malignant growth at head of pancreas.

Case 17.—Patient, aged 24 years. Following blow on head tumor developed, subsequently followed by six or eight others in different parts of head. Still another developed, which was re-

^{7.} London Lancet, 1899, vol. i, p. 584.

moved. Microscopical examination showed it to be a fibro-sarcoma. The others disappeared spontaneously, but patient nevertheless succumbed. In summing up, the author states, "In a cancer, such a disappearance (spontaneous) seems to be quite inconceivable, unless we assume the disease to be one of an infective character, in which the result as measured by the growth, is in direct proportion to the amount of poison absorbed or manufactured within a body which is more or less predisposed to its action."

D'Aguanno⁸ discusses the question of the disappearance of malignant tumors and refers to the fact that Ziegler believes this impossible, and that the disappearance is only temporary, resulting in later new development. Their partial disappearance is, however, observed. He relates the case of a boy, aged 13, malignant tumor disappeared. The author's conclusions are as follows:

1. The reduction or the spontaneous disappearance of growths may occur with regard to tumors of the pharynx and naso-pharyngeal space as elsewhere.

2. This retrogressive feature takes place not only in cases of benign tumors, or for adenoid vegetations where it is the rule, but also in case of tumors of malignant nature whether they take their origin in the connective tissue or originate in the epithelial tissues.

3. This retrogressive process occurs most often (outside of the cases of parasitic infection) through alterations of the *stroma* of the *vascular walls* of the tumor and their contents.

Plenio⁹ reports the case of a patient 22 years of age, female. Hereditary antecedents negative. Two years before had noticed a "thickness" under the skin over the right gluteal muscle, which had during the last eight months spread to the inguinal region. Tumors increased in size rapidly. In September, 1883, patient was brought to hospital and physical examination showed well nourished, well built woman; there was an enormous tumor over the right gluteal muscles; the skin could not be moved over the mass easily, and in the center was colored blue. Tumor was of very hard consistency. Measurements were from the spine to the os sacrum, 39 cm., oppositely 26 cm. Another tumor of hard consistency was found in the inguinal region. Diagnosis was made sarcoma. On following day the small tumor was removed, but it appeared impossible to remove the larger growth entire, but some adhesions were broken up and a part removed. Prognosis was given as very grave. Preparations of salicylic acid were used. (Microscopical

^{8.} Bull. d. Mal. dell. Orecchio, etc., October, 1899, p. 237.

^{9.} Arch. f. klin. Chir., 1886, vol. xxxiv, p. 698.

examination of the excised part of tumor showed it to be a melanosarcoma.) Patient contracted pneumonia and as this disease left her the tumor gradually decreased in size. December 6 there was but an "infiltration palpabel." During the year 1884 the growth entirely disappeared, appetite returned, and general state of health was normal. In 1885 patient was again seen; was eight months pregnant and in perfect health.

Warthin and Spitzley¹⁰ have related a number of vanishing tumors of non-malignant character, reaching the following conclusions:

- 1. That in spite of skilful clinical observation, the ultimate behavior of a tumor is seldom to be determined except by microscopical examination, and that many seeming malignant neoplasms are taken to be such when really they are but the outcome of an inflammatory condition.
- 2. That probably no true neoplasm malignant in nature, ever disappeared except through retrograde changes induced into itself through infection of the tumor tissue, or through affections or infections of other parts of the body, having, by reason of toxins, practically the same effect. To this there are extremely rare exceptions in which the disappearance of the growth takes place by an egress or by retrograde processes over those of growth.
- 3. That we must look to the inflammatory process, acute or chronic, for the explanation of the appearance or disappearance of these masses of tissue, which before and even during explorations, appear to be actual new growths.

Watson¹¹ relates the following: Patient, a woman, aged 36, presented a large pendulous tumor attached to left side of the back; growth presented the appearance of a lipoma undergoing degeneration. Growth was removed and several independent microscopic examinations showed it to be a mixed round and spindle-cell sarcoma. A week after operation wound ulcerated and tumor rapidly reappeared, quickly reaching to former size. The growth was so extensive that its thorough removal was considered impossible. After a time the tumor began to decrease and gradually shrank and the wound entirely cicatrized. One year after operation the patient was in excellent health, the tumor was less prominent, and hung as a loose sack of skin. Except for the ulceration no inflammatory phenomena presented themselves locally after the operation.

Remarks.—The fact that ulceration occurred and was accompanied by fever offers an explanation of the disappearance of the

^{10.} Med. News, New York, 1901, vol. lxxix, p. 442.

^{11.} London Lancet, Feb. 1, 1902, p. 300.

sarcoma in this case. The author quotes Wyeth as having pointed out the value of infection as a cure in sarcoma.

Randolph¹² presents a patient. male, aged 43. Three years before there appeared on the posterior aspect of the left forearm, about the junction of the upper and middle thirds, a small nodule beneath the skin, which was movable and painless. The mass grew for six months, remained stationery then until two weeks before operation. when it exhibited signs of inflammatory reaction. The mass was excised and two weeks later the wound healed by primary union. There is no evidence of recurrence.

Pathological Report.—The mass is flattened, slightly elliptical. 1½x2x¾ in. It has no capsule, but has an envelope which is derived from the surrounding connective tissue. On section it presents a gravish white appearance, composed of dry friable fibrous material.

His conclusions are, first, that a sarcomatous growth started in the subcutaneous tissue; second, that it grew steadily for six months and then, for some unknown reason, became arrested; third, that a necrosis or atrophy of the cells of the tumor took place; fourth, that later the inactive tissue began to act as an irritant, and the response was productive of inflammatory process which endeavored to remove a foreign body; fifth, the very abundant presence and peculiar change of the giant cells seems to show that the function of these cells is an absorptive one. In the discussion Dr. Stengel said that he had under observation a patient with multiple sarcoma in which the tumor at times disappeared. It was, he said, difficult to understand the disappearance of carcinoma, sarcoma, and tuberculous growths.

Dr. Leonard Freeman¹³ makes the statement that fibrous cancers of the breast occasionally undergo spontaneous cure, especially in old women, and quotes Billroth and Kaposi,14 who assert that superficial epitheliomata of the skin sometimes heal without treatment. He relates Stoerck's case of epithelioma of the tonsil which disappeared without interference, but in which recurrence took place in one year. He also records the following: A man, aged 38, giving no history of syphilis, developed a small superficial, indurated sore on the right half of the lower lip at the muco-cutaneous junction. After partially disappearing and again enlarging, the ulcer finally disappeared, leaving a slight sear. Less than a year afterward, and nearly two years from the beginning of the disease on the lip a swelling was noticed in the right submaxillary region. Nine

Proc. Society of Philadelphia, vol. vii, 1904, p. 130.
 Trans. Med. and Surg. Assn., 1900, vol. xviii, p. 303.
 Path. u. Haut. Krank., 1887, p. 871.

or ten months later this was removed. Local recurrence took place within three weeks. After another operation the growth was temporarily checked, recurring, however, and destroying the patient. Microscopic examination of the tumor in the neck showed typical epithelioma.

Freeman concludes that although microscopic evidence of the cancerous nature of the original ulcer of the lip was wanting, circumstantial evidence, presumably the development of a secondary malignant growth, was so strong as to admit of no reasonable doubt.

Gaylord and Clowes¹⁵ have found in addition to the above cases, the following:

Senger. 16 Epithelioma of the tongue with complete disappearance, leaving nothing but a scar in the mucosa. No recurrence one vear later.

Crosbie.17 Cancer of the lip in which the diagnosis of malignancy was confirmed by pathological examination. After a small portion was removed by scissors the remaining disappeared entirely.

Gould. A woman presented a typical scirrhous cancer of the breast, which was removed, and upon microscopic examination the diagnosis was confirmed. Later, recurring nodules were found around the scar. She was considered inoperable, and although symptoms of metastatic growths elsewhere developed to a considerable extent, these all finally disappeared. The patient gained flesh and returned to apparent health. The skin nodules as well as an enlarged gland in the axilla and neck all disappeared.

Rotter. 19 A case of malignant adenoma of the rectum, followed by spontaneous healing. Diagnosis was confirmed by microscopic examination by Orth. Rectum was extirpated, recurrence took place, the diagnosis of which was again confirmed by the micro-There were numerous curettings, each, however, followed by such rapid recurrence that the patient was finally discharged, incurable, April 18, 1896. In July, 1896, Rotter again examined the case and was surprised to find all evidence of tumor absent, the growth having apparently completely disappeared. Death occurred three years later from metastasis.

Tripier²⁰ reports two cases of sarcoma, the diagnosis of one being doubtful. The other was a case of numerous nodules in the epitroclear and epicondylar region of both limbs, with numerous nodules elsewhere. Microscopic examination of one nodule was

^{15.} Surg., Gyne. and Obst., vol. il, June, 1906, p. 633.

^{16.} Verhandl. d. deut. Ges. f. Chir., 1894, i, p. 171.

^{17.} Brit. Med. Jour., Feb. 11, 1899, p. 338.

Clinical Society's Trans., vol. xxx.
 Arch. f. klin. Chir., vol. lviii, p. 357, 1899.

^{20.} Lyon Medical, 1876.

positive. At last examination, six years later, the patient was in apparently good health, tumors having completely disappeared.

Hormann.²¹ Chorion carcinoma of the uterus with metastatis in the vaginal wall. Microscopic diagnosis was made by Albrecht. Numerous curettings were done, but no radical operation. The patient became pregnant and was delivered at term, followed by normal return of menses. Three years after first examination all evidence of tumor had disappeared, patient being in apparent good health.

Noble.²² Chorion carcinoma, with partial removal through hysterectomy. Sixteen months after operation patient presented every appearance of good health, and careful examination failed to show any evidence of tumor. Diagnosis in this case was confirmed by the microscope.

Littauer.²³ Soft nodule in the uterus. Scrapings showed epithelial proliferation. No operation was performed. Examination of scrapings of second curetting was negative. One year after curettage patient was entirely well.

Fleishmann.²⁴ Nodule on vaginal wall and enlarged uterus. Nodule was removed and uterus curetted. Microscopic diagnosis was chorion cancer. Ten months later no evidence of tumor could be detected.

Von Franque.²⁵ Case of chorion cancer. Diagnosis confirmed by microscope. Uterus curetted, followed by restoration to complete health.

Langhans.²⁶ Vaginal nodule, recurrence after removal. Nodule finally broke down and healed spontaneously. Microscopic examination positive. Complete recovery ten months later.

In view of the authentic cases reported above, and of the animal experiments beginning with those of Wehr in 1883, down to those of Gaylord and Clowes, it must be conceded that undoubted cases of malignant growths disappear spontaneously.

As to the nature of the process involved, the peculiarities of or causes for the same, one must turn to future investigations of the pathologist. The clinician can only report clinical facts, but it is to the laboratory that we must look for causes.

^{21.} Hagar's Beitrage z. Geb. u. Gyn., Bd. viii, H. 3, 1904.

^{22.} American Jour. of Obst., vol. xlvi, No. 3, p. 289.

^{23.} Arch. f. Gyn., vol. lxxii, p. 294.

^{24.} Monatsschrift f, Geb. u. Gyn., Bd. xvii, II. 4.

^{25.} Zeit. f. Geb. u. Gyn., Bd. xlix, H. i

²⁶ Beitr. z. Geb. u. Gyn., Bd. v, H. I, 1901.

DISCUSSION.

Dr. C. L. Minor said that the subject of sarcoma or any malignant disease in the nose was of especial interest to him, inasmuch as during the last two years he had had three cases of sarcoma and two of carcinoma. Two of the former and the latter were reported to the meeting of the Academy last year. In reference to disappearing tumors in the nose of a malignant type, he was not familiar with the literature, but believed that pathologists had recognized for years that there are tumors, especially on the legs, which give the cell formation of sarcomata that disappear, leaving pigmented areas behind. The old nomenclature for such a condition was mycosis fungoides. If such a condition could exist in the skin he believes it would only be natural that it might occur in the nose.

Dr. Holinger said he did not think that spontaneous recovery from sarcoma should be looked on as something very exceptional. He recalled two distinct cases of sarcoma cured for three and ten years respectively. One was sarcoma of the nose; the diagnosis was made by a competent pathologist, Dr. Evans of Columbus Laboratory, Chicago. He looked over the specimens personally and his diagnosis was sarcoma. Dr. Holinger said he had no chance to remove the tumor through the nose, because it was too large, and at the first touch there was such a hemorrhage that everything was simply flooded; so he made an incision as for a Killian operation, remembering the fact that a great number of these sarcomata really arise from the sinuses at the roof of the nasal cavity. The patient made a very quick and complete recovery. It is three and a half years since the operation. He had seen the patient a number of times since, and there is no indication of recurrence either locally or in the neighborhood.

Another case was that of a patient who had sarcoma, not of the nose, but of the neck, arising from the base of the skull. The diagnosis, clinically, not microscopically, had been made by a number of men, among them Dr. Fenger himself, who, after seeing the patient, said, "Don't let anyone touch this neck." It was absolutely immovable against the base of the skull. The skull could not be moved without the growth, or the growth without the skull. The patient used all kinds of applications. When Dr. Holinger saw him, the tumor showed deep fluctuations. He opened a small abscess on the top of the growth at the side of the neck, and under the impression that he felt a deep fluctuation he stuck the knife into it its whole length, about an inch and a half, when a cupful of pus was evacuated. No further operation was done. The patient is well to-day. This history dates back at least ten years. The sarcoma became infected from the applications and broke down, forming a big abscess after a duration of about eighteen months.

Dr. Dundas Grant, London, Eng., said that his own experience in London in regard to these apparent sarcomatous tumors of the nose had been very much the same as that of his American confreres, and apparently the ordinary rules of simple laryngology do not apply. The fact is in cases in which the diagnosis of sarcoma in the nose is made by microscopists, it should, under no circumstances, be a bar to operation if mechanical removal is possible.

Dr. Baldwin mentioned the case of a youth, a boy of 15, in whom the growth appeared on one side of the nose and projected so as to entirely fill the naso-pharynx. Operation proved it to have been just outside the choanse. The patient made a good recovery, but in three months the growth commenced to return, bleeding recurred, and in all probability the boy is dead, but the hemorrhage before the operation was something furious, and also at the time of the operation when the growth was removed. Dr. Baldwin thinks if the boy had been under ether he certainly would have died, but having the pack ready it was done with the blood coming simply as fast

as it could come. It stopped it almost immediately, but it so soon recurred, within three months, that it was almost as large as it was in the first place.

DR. BECK said he believed these cases to be most interesting from the standpoint of histologic pathology. It is well-known from the large amount of literature about the slow growth, the slow destructiveness of the intranasal sarcomata, but most of these growths are fibroid, and the sarcomata are classed more malignant, no matter whether occurring in the nose or anywhere else. They recur repeatedly. In being called on to open the discussion on Dr. Miner's paper last year he had the chance to go over the literature of the intrasarcoma and found that that point was brought out very clearly. He then called attention to the fact that the more fibrous the tumor the less liable its recurrence. There was Dr. Price-Brown's case of a sarcoma of the nose that had been operated on seven years previous. To all appearances the nasal cavity looked as if it was a sinus disease, although Dr. Price had three bottles, about the same material as shown at that meeting. It was a fibrosarcoma, and the section showed fibrous tissue more than any other type. As far as his experience went, and Dr. Ballenger would bear him out in this particular case (a case of typical nasal sarcoma that was operated on now some nine years ago), that there is absolutely no recurrence. The operation was that of the radical resection of the superior maxillary bone, this showing that the fibrous type is of slow growth.

DR. ROBERT LEVY, Denver, said that as to the existence of two primary foci, it is of course impossible to say definitely that this was or was not the case. As to the pigmentation of the tumor on the leg this did not disappear with the reduction of the tumor. The clinical diagnosis is not easy nor is the microscopic. One must be extremely cautious in making a diagnosis, no matter what the clinical or microscopic evidence is. The histologic report of one man is not always sufficient and it is very much better if both clinical and microscopic evidence as reported on by competent men coincide. In the record of cases found in his paper there are none of nasal sarcomata, in fact the literature of these growths in the nose is very scanty, most of the cases in which spontaneous disappearance of malignant tumors were recorded occurred in regions of the body such as the abdomen and neck. The case of Dr. Loeb's in which there was a gradual disappearance of the tumor after profuse hemorrhage is analogous to several that have been reported in the literature. It seems that these growths do retrograde after profuse hemorrhage from manipulative procedures, but they usually recur. The case of Dr. Holinger in which, after the removal of a large amount of pus, the growth disappeared, is similar to others, especially those of Gregg Smith.

CLEFT PALATE AND HARE-LIP.

KATE WYLIE BALDWIN, M.D. PHILADELPHIA, PA.

Cleft palate fortunately is not a very frequent deformity; still, according to the most reliable statistics, one child in every eighteen hundred has some deformity of lips or palate.

Cleft palate is usually, but not universally, complicated by a fissure of the lip, which may be single or double, complete or incomplete. Such deformity may be a slight central defect in the intermaxillary bone, with a small notch in the lip. A bifurcated usula,

or any degree between these slight defects, to one including all of the soft and hard palate, dental arch; with a projecting, or in rare cases the complete absence of the intermaxillary bone. The skin of the lip may be united when the muscles are not. The cleft of the hard palate may be single or double; if double, the space is divided by the vomer. A double cleft is not of necessity more difficult to close than a wide unilateral one.

I believe that Broca, Albrecht and Czerny are justified in holding that the hare-lip fissure does not usually, as is generally held, pass outside of the incisor teeth, but between the central and the lateral incisors. An incisor may be wanting and the cleft appear to be next the cuspid. Occasionally there may be supernumerary incisors. Normally the intermaxillary bone carries only the central incisors. When the fissure does pass between the lateral incisor and the cuspid it will be found that the nasal cavity is not opened. We may have a cleft of either the soft or the hard palate alone; either one, with or without the hare-lip. A cleft due to disease may be of almost any extent. At this point consider the facial clefts for a minute. I shall deal only with the congenital clefts.

Although not frequent, cleft palate is probably quite as often met with as any congenital deformity of equal importance to the individual. If not operated on it is a constant reminder of defect, which must to a great extent change the disposition and general mental development of the child. An obturator, no matter how perfect it may be, does not obliterate the deformity; simply substitute a mechanical for a natural part. Surgical measures may almost, if not entirely obliterate the defect, and the child forget it. It is for this reason that I urge that we resort to prothesis only after it is proven that surgery is of no avail. This will leave but few cases for an obturator, but in these few it is of inestimable value; and it is well that such useful ones were made before the surgical treatment advanced to its present, even though imperfect, stage.

Each individual experience has more or less determined the time and methods suited to secure the desired results with the least mortality. Different times and methods result differently in the hands of different operators. To a certain extent, each individual case is a law unto itself. Much depends on the general health of the patient and the extent of the deformity. If it prevent the proper nourishment of the child the deformity should be completely or partially corrected at the very earliest possible age; while delay, even to adult life, in some cases, may be desirable. One surgeon claims success only if the operation be performed before the child learns to speak; another selects five to seven years as the most

appropriate time; another, after second dentition, after puberty. Still others say, have the full cooperation of the patient, no matter what age that may be. Some operate the day of birth on the lip, if not on lip and palate both. I find reported a successful operation for hare-lip and cleft palate on a child seven days old, and one by Wolff on a man of 52. Doubtless successful cases could be found at almost any age between these extremes. The earlier surgeons seldom attempted the operation in infancy. Many who formerly operated late now select the earliest time consistent with the general condition of the child. Others always advise mechanical appliances for all except the very slight deformities. Formerly Fillibrown, of Boston, and others gave preference to the obturator; while at present they decide for operation.

Success must include at least two things. Success surgically is of great importance, for without this we cannot hope for perfect



Cast No. 1A. Gutta percha plate worn before operation.

speech, which is of great importance; as it is speech like his fellowmen that makes much for the development of the individual. This you say may be accomplished by prothesis; true, it may be, but it does not remove the deformity which is an ever present annoyance. Many a child does not speak distinctly, even with a perfect palate. Defective speech is incident to many conditions other than cleft palate and hare-lip, so we must not be disappointed if perfect speech does not result (after correction) of this cause. Eliminate all causes so far as possible and do not neglect the training, both before and after the operation.

In favor of early operation is given: Child more easily nourished; perfect speech more likely to result; palatine arch not so high and more accessible; little or no anesthetic required; hemorrhage in young children always slight; elevation of mucous membrane and perichondrium easy; vitality of flap distinctly greater, and union between surface much more apt to take place. Osteo-clasis must be done under 4 years of age. Later the bones cannot safely be forced together. A partial closure tends to narrow the remaining cleft.

In favor of late operation the argument is that one has full cooperation of the patient; the tissues are stronger and better nourished; nutrition of the teeth not so likely to be interfered with. If the hare-lip has been closed early the cleft in the palate will be much diminished. Early uranoplasty interferes with the complete development of the skeleton of the arch. There is much greater mortality under 18 months. A. Jacobi is quoted as saying that tissues of the palate can not be operated on until the child is 4 or 5 years old, but that unless there be strong contraindications the hare-lip should be operated on the first day of life, when immediate necessity of feeding is not urgent.

If the cleft in the lip and palate is not to be closed at one sitting, but within a few weeks or months of each other, it is well to take the palate first on account of the added room and better view. If one must be left for years, operate on the lip first. At the present time the general opinion seems in favor of at least moderately early surgical treatment. Neglected cases will occasionally present themselves and advanced years alone will seldom bar surgical treatment.

In 1879 W. Fairlie Clarke writes: "If there is a large gap, the patient must be content to wear an artificial palate. The soft palate may in some cases be united and a plate used to fill in the hard palate." Another author says "that if mechanical closure be decided upon it is no good to unite the velum as it will of necessity have to be split open to make an obturator do its best work." obturator is not practical until after second dentition on account of imperfect anchorage, and the necessity for frequent changes. The average time during which a Tubbs velum retains its usefulness is sixteen months. The worst record is four vela in two years; while the best is three in five years. The majority use about one velum a year. In 1881 Baker made his first successful appliance. As late as 1892 very pessimistic views of the surgical treatment of cleft palate were presented by those who preferred Kingsley's obturators and by others who gave preference to Svensen's appliances. Prothesis has been very thoroughly advocated, but the writers have entirely lost sight of the achievements of modern plastic surgery in the hands of many operators, who have obtained ideal results. Price, of Ann Arbor, describes a method of reducing the cleft by means of a plate and spring.

Operation being decided on, where and how shall we secure sufficient tissue to close the space without tension. In children under 4 years of age osteoclasis of one sort or another may be selected. I have seen severe shock and almost immediate death follow osteoclasis. It does not give superior results; often several operations being necessary. This operation requires much courage in one's convictions. For any operation the patient must be in good general condition, and, when practical, should have some previous training and treatment. In some cases if the patient is standing the operation well and there is not much loss of blood, the lip, hard and soft



Cast No. 1B. Hard palate showing cleft.

palate may all be closed at one time. It is good judgment not to extend the operation over too long a time, no matter what the immediate condition may be, as an unusual amount of shock often results. Wolff and others often operate in two stages. First, mark out and elevate the flaps and leave them four days to control hemorrhage and improve nutrition. Wolff claims that the great mortality under 18 months of age would be much lessened were more care taken to avoid loss of blood. Flap tissue has been and may be obtained, according to the individual demands, from the remaining portion of the palate; the septum nasi; the inferior turbinal; the posterior wall of the pharynx: the side of the tongue; the forehead, lip or cheek. That from the palate or septum is most fre-

quently used. The flaps may be cut and manipulated in various ways. Make an incision parallel to the cleft, near the alveolar border through mucous membrane and perichondrium and through this elevate to the edge of the cleft, and well around the edge, especially at the junction of hard and soft palate, as by remembering this myotomy, to give relaxation, is almost invariably avoided. Freshen the edges of the cleft, slide over the flaps and unite the freshened edges with silk, silk-worm gut, horse hair or silver wire. Closed sutures are a great convenience. By using a slip knot first the edges are more easily adjusted and the knot is fixed by shot or a square knot. Suture must be close together, especially in the soft palate and uvula. A flap consisting of mucous membrane and perichondrium may all be taken from one side. Make an incision parallel to the edge of the cleft just within the alveolar border and dissect free to and around the free border which is used as a hinge on which the flap-after being divided at the ends-is turned directly over, bringing the perichondrial surface into the mouth. The free edge of this flap is then sutured between the split edge of the opposite side of the cleft. This method is much better adapted to the hard than to the soft palate. Parkhill uses a triangular flap, the apex on one side being front and on the back the flaps are elevated and slid over to the median line where the freshened edges are sutured in the usual way. Another suggestion for flaps is to mark out a triangle on each side, the base being the edge of the cleft and the apex an imaginary point beyond the second molar tooth. The two sides of the triangle are connected just inside the alveolar ridge by an incision through the mucous membrane and perichondrium; through this the tissues are elevated to and around the cleft. The ends are not divided but the tissues slid over and in the median line united in the usual way.

Murray, of Liverpool, uses a button suture to bring up the flattened ala. For the same, Wyeth of New York, advances the anterior portion of the upper jaw on the short side and secures it with silver wire sutures. He does this six to eight weeks before commencing work on the other parts.

M. Roux, in 1819, made the first successful operation for cleft palate. This included only velum and uvula. J. Mason Warren, of Boston, was the first to devise an operation for cure of fissure of the hard palate. First published in 1843. Warren was also first to suggest dividing the muscles to relieve tension. Roux employed transverse incisions for which Dieffenbach substituted incisions parallel to the fissure. I have gone over the literature quite thoroughly and wish to give due credit for all suggestions which have in

any way contributed to the present, though, perhaps, still imperfect method of treatment. After dentition the proper occlusion of the upper and lower teeth is of much importance. For feeding before or after operation a nipple with soft rubber wings and the opening on the under side in place of the end may be used. Peck suggests a sounding board as a valuable aid in teaching a child to talk. One case of severe secondary hemorrhage is reported, caused by the child's picking at the sutures. A few turns of plaster bandages will control the arms, or that which is better is a pair of small



Cast No. 2.—Showing result obtained after operation.

straight sleeves which prevent flexion at the elbow but leave free action of the shoulder joint.

The difficulties are many and even the slight defects require study, patience and surgical skill. Not in every case will good union along the full length of cleft be secured with the first operation. If a stitch gives out, as soon as possible introduce another. Sutures in the lip should be removed the second or third day and tension prevented by the use of adhesive plaster; in the harder soft palate they may remain weeks if they are not cutting and should be removed only one or two at a time. When necessary, a relaxation suture may be introduced several days after the primary operation. Any point not inclined to close may be stimulated with nitrate of silver, compound tincture of benzoin or tincture of cantharides.

Keep the parts as clean as possible by frequent douches. Prevent talking. Feed with liquids or semi-liquids and in extreme cases by rectum. Keep the patient out of doors as much as possible.

The case I wish specially to report is that of Robert C., 13 years and 9 months old. A country boy somewhat under size. The cleft in the lip, which had been repaired when he was 7 months old, must have been quite extensive, judging from the scar, which extended at the base of the lip nearly the full width of the nose, with a much puckered one at right angle to this which drew the middle of the lip under the left ala. This diminished the flexibility of the lip to such an extent that he moved it very little. Three teeth were missing and a wide triangular gap in the dental arch opened the left side of the nose, which cavity was one with the mouth, the hard and soft palate being completely divided. The septum which was displaced to the right anteriorly, extended to and was united to the pharvnx, dividing it into two distinct cavities, the left being one with the nose and mouth. An abnormally developed cartilage just inside the left vestibule enabled him to completely close that side of the nose when swallowing. The right vestibule was three-fourths closed by the deflected and thickened cartilage. The nasal and pharvngeal tissues were covered with crusts and purulent secretion. Hearing was very deficient, both ears being filled with necrosed epithelium, pus and granulation tissue. The nasal and oral secretions were very offensive. The upper jaw was broad and flat, the under jaw projecting much in front of it. He had long, bushy red hair and wore a heavy, squeaky, iron brace on the right leg and foot, they having been badly crushed by a railroad train when he was ? years old. Robert's was an exceptional case, for with all this handicap he had a sunny disposition and a mental development quite beyond the average boy of his age. Had it not been for this and the fact that he had received careful home training, and was ready to assist me in every way possible, it would have been very hard to spend with him the time necessary even to hope for results.

For four months we devoted the time to all-around cleansing and disinfecting. During this time I had this plate made so as to freely escape the roof of the mouth, as we hoped to have it after operation. He became accustomed to it and was able to eat much better with than without it.

Cast No. 1 shows the condition of the mouth April 12, 1905. when under general anesthesia, produced by ether and continued with chloroform. I, with Wolff's instruments, did a plastic operation including the soft and all of the hard palate, except a small part anteriorly, which, if included, would have endangered the

nutrition of the flaps. At the same time I cut through the extension of the septum. The flaps were obtained from the palate and septum, the tissue being directed free from a line just inside the alveolar ridge to and around the edge of the cleft on the left side and well up on the septum on the right. By means of the previously adjusted plate I was able to hold an antiseptic dressing in contact with the wound and at the same time protect it from the tongue and food.

There was quite free bleeding at times during the operation, but the boy was put to bed in good condition. Two hours later I was told over the telephone that there was some bleeding. I gave instructions and made ready to return to the hospital when another report made me go at once. I found the patient in a very critical condition, no radial pulse and the lips and ears absolutely blanched. I quickly drew some packing up behind the palate and met it with some through the left side of the nose. This promptly stopped the bleeding. Tincture of iron, strychnin, hypodermoclysis, and at the same time normal saline solution and bovonine by the bowel saved my boy. The resident surgeon had gone immediately to another operation, leaving the case with a nurse not alive to conditions. For several days we gave boyonine by the bowel every four to six hours in addition to all the liquid and semi-liquid nourishment we could administer by mouth. The nose and mouth were thoroughly and frequently cleansed. For two weeks he spoke but once. At the end of that time he left the hospital and came to the office for treatment. I several times did a little patching, which, with stimulation, gave complete union the full extent of the operation. Never despair! If a stitch gives out put in another and put them very close together at first, especially in the soft palate and uvula. At one time I thought it had entirely gone to smash, and the operation would have resulted in almost complete failure had I not at once gathered courage to put in new stitches.

Robert went home the first of July and returned December 4, much improved by his country outing. I now devoted my efforts especially to the ears, giving the teeth and jaws over to Dr. Alice M. Norton, the dentist who had made the protecting plate. Dr. Norton gave much time and thought to the work and by various mechanical appliances was able to bring forward the upper and push back the lower jaw until the teeth occluded and then put in a strong, heavy bridge carrying three teeth. The bridge and the change in the jaw closed the remaining part of the cleft and probably much better than I could have done at the time of the primary operation. My only regret is that I did not have the dental

work done first. I thoroughly believe that after second dentition it will be wise, first to put the patient in the hands of a good dentist accustomed to regulating and have the jaws brought into as nearly normal relation to each other as is possible and held by some mechanical device until there is no danger of recurrence of the deformity. It will, in many cases, greatly diminish the cleft and improve the general condition of the mouth. One stage of the dental work came near proving disastrous to the new tissue of the hard palate. Had the tension been exerted a few hours longer in one direction it would have completely opened the hard palate. I shall never again let the dental work come second, as so very much depends upon it. The discharge from the ears entirely stopped and he has about three-fourth normal hearing. The nasal discharge continued to some extent when he finally left town. The flexibility of the lip was much improved by dividing the puckered scar with the knife and the transverse one with the electric needle.

The right vestibule was well opened by dissecting out the cartilage. Unfortunately, the suture holding the left ala in place gave out prematurely and I did not consider it wise to operate again at that time. He bore perfectly well all the work on the palate and the regulating, but the instant I commenced work at the nasolabial junction he became very faint with irregular heart action and the radial pulse very weak or entirely absent. The heart gradually recovered itself, but he felt badly for several hours. The needling of the scar at the base of the lip had the same effect, so that I was able to do but very little at one sitting. I find one similar case reported, where work at this point caused irregular heart action. Had we been working under a general anesthetic, what would have been the result? Robert developed very rapidly the last six months he was under treatment and the nervous strain from the regulating was considerable. In a few years he may be able to stand having the nose brought up into better shape. He was able to speak so that anyone was able to understand him. He was readily understood over the telephone.

DISCUSSION.

Dr. Beck cited three cases which came under his observation a short time ago. Two of the cases were in infants, one three weeks old and the other four and a half months old. It had been his privilege and pleasure to operate on these cases and observe them. He chose to operate as early as possible on account of the inability to feed these babies. He employed the method recommended by Gussenbauer and so ably modified by Charles Mayo. He saw Dr. Mayo perform this operation and immediately followed the same procedure. It differs from the method of Brophy in that no attempt is made to change the bones of the face, but simply to freshen up the edges all along the mucoperiosteum on both sides sufficiently. Then along the margin of the teeth, of the hard palate, counter incisions are made and

with a periosteal elevator the whole mucoperiosteum is lifted from the hard palate. Some tape is then passed from one peripheral incision into the other, the cleft is sutured with fine black silk, and it is essential to get the knot of the ligature away from the incision—the old surgical principle of tying on the side. When that is completed these loosened flaps must be drawn together and tied by means of the tape. This tape is allowed to remain for ten days when it is ready to be removed as union has usually taken place and the marginal counter incisions have filled up by granulation tissue.

The third case was a boy seven and a half months old. Four attempts were made in closing the cleft, and he succeeded gradually in the several attempts, always a little piece at a time, finally uniting into a sort of a uvula. So far as the education of the speech after the operation is concerned, that is of the utmost importance, and he believes that a man by the name of Brown of Milwaukee has an excellent method. It is not his own method, but the method of a European. Brown has published an excellent article in English on the subject.

Dr. Ballenger, Chicago, referring to the method of treatment, said that he performed an operation a couple of years ago on a patient 36 years of age with a rather wide cleft of the hard palate, the soft palate having been some years previously partially closed. In the first operation he failed to get union of the tissue. He concluded that the reason was on account of the secretions from the nose which were rather offensive, and coming down interfered with the healing process. In the second operation he used practically the method Dr. Beck described, with slight modifications. He had a special nurse placed on the case and had irrigation performed for the first two or three days every twenty minutes, day and night. The por patient had to suffer slight inconvenience, but a complete union was happily obtained, although the patient was advanced in life. The principle of the dressing, that is, the absence of any dressing and irrigation practiced at short intervals might sometimes be of value in these obstinate cases when the secretions from the nose prevent union.

There is another motive that Dr. Baldwin did not speak of which sometimes should enter into the determination to perform an operation, especially in adult cases. One of his patients, a maiden lady, was humiliated because she was not like her brothers and sisters, and other people of her acquaintance. It was a mortification to her that she had this defect, and now that she has had the correction made she is a very happy woman, though her speech is not greatly improved. Her mental state is very much better. She does not need to wear the obturator, and in many respects the operation was justified. So the mental condition of adult patients must be taken into consideration at least as a motive, although very much improvement in speech cannot be promised.

Dr. Baldwin said that the work on the nose is not as good as it ought to be because of the nervous condition of the patients, as they would be several hours in recovering anything like a good condition. The difficulty of getting the coöperation of dentists is an important point. The patients themselves would be much better if the dentist did his part of the work first. It would narrow the cleft very much indeed and leave much less for the surgeon to do, and that is very important. In the case of adults, or any time after the second dentition, Dr. Baldwin thinks it would be better to have the dentist bring the teeth into as good condition as possible, making the bite correct, and in every way filling in as much as possible. Dr. Baldwin has had no experience whatever with incubation and the packing of the mouth afterward. The plate was inserted after the operation very nicely and a little antiseptic salve was kept in the packing with the wound, the action of the tongue being kept away from it. The patient wore it after as well as before the operation, and it was of very great service.

COMPLETE REMOVAL OF FAUCIAL TONSILS.

OVIDUS ARTHUR GRIFFIN, B.S., M.D.

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ANN ARBOR, MICHIGAN.

Aside from a broader knowledge of detail that results from a repetition of facts, it would be superfluous on this occasion to give an extended discussion of this subject, but inasmuch as unanimity of opinion does not obtain throughout the profession as to the proper method of treatment of diseased faucial tonsils and the best mode of their removal, and being desirous of presenting a method which has proven satisfactory in my practice, I beg to direct your attention to the following facts.

Owing to their intermediate position between the mouth and pharynx and their glandular structure, the faucial tonsils frequently become infected and chronically diseased by the passage of food or foreign matter into the ramifying glandular duets which



Fig. 1.-Dr. Griffin's tonsil scissors.

open upon their exposed surfaces, and after a time, their function of pharyngeal lubrication becomes so perverted that the ducts and glands finally become distended and indurated by the retention of a caseated secretion, composed mostly of desquamated epithelium. leucocytes, and micro-organisms. The resulting ptomains of decomposition permeate the surrounding lymphatic system, leading to chronic inflammation of adjacent pharyngeal structures and often evidencing its systematic effect by the production of rheumatic symptoms.

Under these circumstances, it would seem that only one method of treatment would be considered, but a perusal of many books upon the subject indicates that palliative measures in the form of gargles, syrups, and applications to the distended ducts constitutes the rational course of treatment. If there be a broad and devious path that leads to disappointment, both to the patient and attending physician, the above procedure, which attacks the disease only super-

ficially, or a partial removal of the tonsils, certainly points the way. On the contrary, however, a total extirpation of the offending tonsillar tissue offers naught but an ultimate cessation of both local and systematic derangements, and no one more fully appreciates this fact than the writer, who was compelled to undergo an operation by three different laryngologists before his tonsils were completely removed and a train of distressing symptoms permanently relieved.

In common with the experience of fellow laryngologists, I realized that with the armamentarium, which obtained until a few years ago, it was impossible to effect a complete operation, until an instrument was devised whereby the adherent pillars could be separated from the tonsillar tissue, preliminary to its removal, especially when the tonsils were submerged. Thus it was, and still

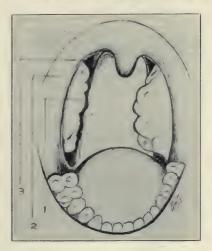


Fig. 2.—With lightning rapidity the artist has effected a complete removal of the right tonsil, as evidenced by the deep, empty tonsillar fossa, which is more readily shown by a retraction of the anterior pillar, and in the following cuts, the details of the procedure are fully illustrated. When traction is applied to an adherent or submerged tonsil, the attached pillars are also drawn toward the median line so that the base of tonsil can not be reached until the pillars are severed from the tonsillar tissue. In Figure 3 the anterior pillar is being separated by means of the scissor, although a curved knife may also be employed, but dense tissue can be as effectually cut. The dotted line indicates position of base of tonsil, to which point the pillar must be loosened.

obtains in the practice of the unskilled, that a majority of the amputated cases had a "recurrence" of tonsils, or as the laity put it, "the tonsils grew in again," while the unfortunate sufferer experienced little or no improvement in his condition. To the informed, however, it is evident that the faucial tonsils do not recur after complete removal, and that the return of former symptoms is due to a retention of some of the originally diseased tissue. How often in advising a removal of tonsils for the correction of a pharyn-

geal or aural disorder have I witnessed that expression of mingled surprise and disgust as the unfortunate patient replied: "Why, I had my tonsils removed by Dr. Blank and he charged me five dol-

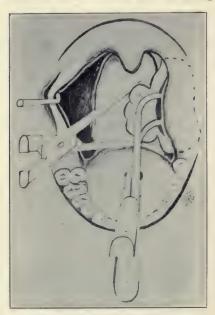


Fig. 3.—Separating anterior pillar.

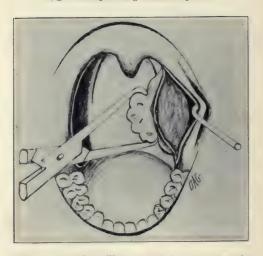


Fig. 4.—Anterior pillar separated and retracted.

lars!" Thus it was, prior to a few years past, that the operation was regarded by both the laity and general practitioners as a simple procedure which anyone could perform, but with improved instru-

mentation and details of technique, the complete removal of tonsils is now justly regarded as a serious and exacting operation which demands as much dexterity and skill as any major operation to secure proper results, and the compensation should be accordingly renumerative.

Realizing the limitations of the knife, tonsillitome. and snare, several years ago, I devised a scissor whereby the pillars could be severed from the tonsils, but even then I could not in all cases completely remove the base of submerged tonsils or the tissue which obliterated the supratonsillar space between the anterior and posterior

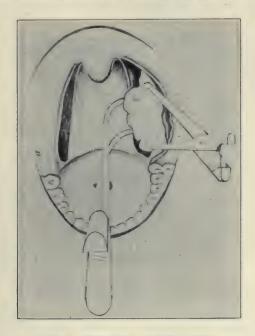


Fig. 5.—Separating posterior pillar.

pillars, until I finally produced the present form of seissor, which is herewith illustrated. By means of this device, the complete operation of separating the adherent pillars and removing the entire tonsil, either right or left, can be effected by the use of a single cutting instrument as shown in the illustrations.

In Figure 2 is pictured a characteristic throat in which the left tonsil is hypertrophied and the ducts distended, while on the other side is located the remains of an unskillful operation or the tonsil may represent a submerged variety. It will be observed that the edges of the anterior pillars are darkened (reddened), showing that a chronic form of inflammation exists behind them whereby the pillars become adherent to the tonsillar tissue.

After the anterior pillar is separated, the traction forceps are changed so that the tonsil is drawn forward and outward when the posterior pillar is easily severed, as shown in Figure 5.

After both anterior and posterior pillars are separated, as illustrated in Figure 6, the opposite angle of mouth is retracted by an assistant and the tonsil is strongly drawn from its fossa toward the median line, while the scissors are introduced into the supratonsillar space and pushed in deeply so as to reach the base of ton-

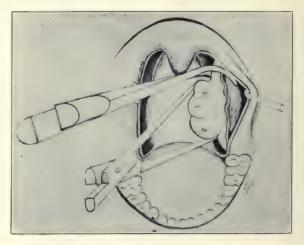


Fig. 6.-Removal left tonsil.

sil before beginning to cut. In this manner, the cavity will be left smooth and clean. The incision is continued downward until the whole base is separated. In some instances, matters may be facilitated by removing the scissors and cutting upward from the bottom after the supratonsillar attachment is separated, or they may be introduced from the front and the pillars pushed away by the flat surface of the scissors, while the curved portion is forced deeply into the tonsillar fossa to reach the base of the tonsil and complete the operation. In many cases, owing to gagging movements of the patient, it may be necessary to remove the tonsil in several pieces, but in favorable instances, the whole mass can be separated at once.

In regard to the occurrence of hemorrhage, it has been my experience that the bleeding from a complete removal of the tonsils is

not more profuse than when a partial extirpation is effected, inasmuch as the remaining soft tissues are favorable to a prompt contraction and retraction of the severed blood vessels, while an indurated mass, which often remains after a partial removal, tends to prevent a closure of the vessels and thus favors prolonged hemorrhage.

While my scissors were devised primarily as a tonsil instrument, I have found them admirably adapted for enucleation of the eye, evisceration of the orbit, and separating adhesions of the palate or uvula to the pharynx.

The seissors are made by F. A. Hardy & Co., Chicago, and H. Pfau, Berlin, Germany.

CONSIDERATIONS RELATIVE TO NASAL OBSTRUCTION.

A. E. PRINCE, M.D. SPRINGFIELD, ILL.

My purpose in choosing such a broad title as "Considerations Relative to Nasal Obstruction," is to put together some thoughts which have a general bearing on the whole subject, without attempting to exhaust any particular phase. The abstract of my paper is embodied in the following questions, an endeavor to answer which will be made in as brief a manner as is consistent.

First: What is the cause of the prejudice regarding tonsil operations, and what is the remedy?

Second: Why do some operators frequently have failures in adenoid operations?

Third: Why do many operators use the cautery and snare in treating inferior turbinal enlargement?

Fourth: Why does anyone attempt an operation for nasal polypus in the middle meatus without removing the middle turbinates?

Fifth: Why does anyone ignore the relation of accessory sinuses in the consideration of nasal obstruction?

Sixth: Why does anyone attempt the handling of a malignant growth, unless he is inclined, in emergency, to open and curette or cauterize with the thermal cautery the remotest corner of any one of the accessory sinuses?

I am convinced that the prejudice against tonsillectomy which prevails is due to the slip-shod methods which have prevailed in the past.

It has seemed such an easy matter to slip a tonsillotome over an enlarged tonsil which is not submerged, and is free from palatal

adhesions, that most of the doctors of the land have indulged in this unscientific method, and in most of the cases left behind a considerable portion of the tonsil.

When one thinks that the reason these organs are hypertrophied, is because of the fight which is being waged on the part of Nature, on the one hand, in her effort to destroy the invading microbes, and the microbes, on the other hand (being tubercular in 10 per cent. of the cases), in their effort to involve the system, the futility of cutting into the barrier wall becomes at once apparent. Further, the operator who is responsible for the prejudice, has been in the habit of ignoring adenoids, hypertrophied turbinates and deflected septums. He has promised good breathing, and the result has been weighed in the balance by the public, and has been found wanting.

Ten good operations will not balance one failure, and as long as physicians perform incomplete operations, prejudice resulting from failure will continue to exist.

To facilitate the removal of the tonsil, it is essential, in the difficult cases, to separate the pillars which may be adherent to the tonsils.



Fig. 1.—Tonsil scissors.

The patient is placed on a chair or table (preferably a Jule chair) capable of inclining the body head downward sufficiently to let all the blood varieties out when the face is turned to the side. The chair is raised ad maximum and the operator sits on a low stool so that his head is as low as that of the patient. An original O'Dwyer's gag is preferred since its curve permits it to be inserted on the right side of the mouth, permitting the largest space for the introduction of the left forefinger into the naso-pharynx. Good operation for nasal obstruction means a comprehensive grasp of the situation and the removal of all the sources of obstruction, whether it be tonsils, adenoids, turbinal enlargement or septum deflections. In the practice of the author all these operations excepting the septum deflection are done at one time and to accomplish this much depends on position, anesthetics, etc., which will be briefly considered.

A combination scissors and separator is here offered, which has been found efficient in the author's hands. After grasping the tonsil with an efficient forcep, it is first inserted under the anterior pillar and the blades separated, next the palato-tonsillar membrane is divided and the incision is carried down behind the tonsil separating the posterior pillar. The tonsil may then be dissected out down to the fauces with such scissors as may meet with favor at the hands of the individual operator.

Answer No. 2.—The adenoid operation is next undertaken. Many operators, for the removal of adenoids, have failed because they are done with a large curette and without digital coöperation.

This is illustrated by cases in which a nodule of adenoid is found anterior to the vomer.

The operator who attempts the operation with a Gottstein's curette or adenotome, will fail to reach such portions. A case comes to mind in which a child had two operations, both under an anesthetic, without result. Upon digital examination, a remnant was found on each side anterior to the posterior line of the vomer, which could only be reached with a narrow curette or a forceps.



Fig. 2.—Adenoid forceps.

As a matter of fact, the curette has been almost discarded in favor of a type of forceps which is here exhibited.

Another reason why adenoid operations are often unsuccessful is the timidity which prevails regarding the use of a a general anesthetic.

An operation which is done without an anesthetic, often is unworthy of the name. If the result were open to inspection after a Gottstein's curette has been thrust into the pharyngeal vault of a frightened child, the surgeon would consider himself disgraced.

In these operations we must attain 100 per cent. of success. The man who exonerates himself by claiming that he told the truth nine times out of ten is to be compared with the doctor who congratulated himself for having had 90 per cent. of success in adenoid operations. The 5 or 10 per cent. of the partial failures may seem very small, but the physician owes it to every individual child that is brought to him suffering from oxygen starvation, to provide capacity for complete aeration. This can only be accomplished by means of a general anesthetic, especially in children.

Here a word is à propos regarding the use of an anesthetic. It matters little whether it be chloroform, ether or ethyl bromid. The main point is that the operator must overcome timidity, for no operation requires more profound anesthesia than those on the throat and nose. Timidity can only be overcome by the establishment of confidence in some quick, simple, always-at-hand method of resuscitation of suspended animation. The method recommended is the direct inspiration. This is accomplished by extending the head, pressing on the stomach with the left hand, closing the nose with the right, placing the operator's mouth near that of the patient and blowing the latter's lungs full of freshly inspired air. Repeat this every three seconds. The ashen or livid lips will assume a normal color and may be maintained so indefinitely. Commence this whenever respiration lags and you will soon gain the confidence in the method which is essential to success.

Regarding the use of the cautery, chemical or galvanic, in the treatment of turbinal obstruction, it is my belief that better results are obtained by the method of excision. An examination of the nose in a condition of intumescence will reveal the fact that there is an amount of mucous surface in excess of that required to cover the inferior turbinal bone. At the posterior end this is distended by the accumulation of blood until quite a balloon is formed, which alternately expands and contracts. The principal symptom is the alternating obstruction of one side or the other.

The treatment of these cases by the cautery method destroys the epithelium, and leaves a membrane which adds little moisture to the air in passing. Submucous cauterizations do not give the lasting benefit derived from excision. The cauterization of the posterior turbinal has proved so unsatisfactory that the majority of operators resort to the snare.

The application of the snare requires the use of cocain, which contracts the vessels, and defeats the very object one wishes to attain. The shrinking of the erectile tissue prevents the application of the snare, and at best, but a small strip of mucous membrane is removed, insufficient to effect a complete relief from the symptoms of obstruction.

This difficulty was experienced by the author about twenty years ago, at which time he designed a forceps for the removal of the hypertrophied redundant tissue along the lower edge and the excessive tissue of the posterior end of inferior turbinal. The forceps was given a concavity on the biting edge corresponding to the curved surface of the inferior turbinal. On the convex surface, it was left open so that it would grasp firmly the tissue and bite through the

membrane. It was made very strong, so that if a portion of bone was found to reach quite near the floor of the inferior meatus, it would cut it away and establish a free meatus, it being the design to remove whatever fell into the grasp of the forceps.

The instrument has not been very popular, owing to insufficient knowledge regarding its manipulation.

In view of the fact that it has been in daily use in the author's hands for this long period, with almost universal satisfaction, it may be permitted to repeat a word regarding its manipulation.

To get the best results, the patient is under the influence of ethyl chlorid or chloroform, to escape the contraction of the vessels which attends the use of cocain. He is placed partly on the right side with body inclined downward.

The instrument is inserted into the inferior meatus with the biting edge down. When the advancing edge has reached the posterior extremity (See cut) of the inferior turbinal, it is turned so that the concave surface is in contact with the free surface of the inferior

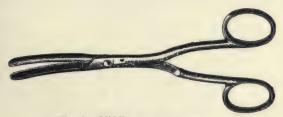


Fig. 3.-Middle turbinal forceps.

turbinal. At this point, the blades are opened, and the rotation is continued, which brings the inferior blade under the lower edge. when it is closed, and secures the redundant soft tissue, and perhaps a narrow strip of the bone along the free lower border.

Before closing, the forefinger of the left hand is inserted back of the palate, and presses the soft post-turbinal tissue into the grasp of the forceps. In this manner a strip is secured, extending the entire length of the inferior turbinal, and representing the amount of tissue that can be spared, and still leave enough to cover the remaining inferior turbinal bone.

There will be considerable hemorrhage which usually ceases spontaneously. I avoid packing or inserting a plug or splint, also occasionally use a compressed sponge, and saturate it when in position with adrenalin solution. Some attention must be given to bridging. The use of a bulb ear syringe, and normal salt solution, three times a day by the patient, will usually complete the cure.

This operation has been done by the author more than one

thousand times, and the minimum of trouble at the time or later, has made this instrument and method regarded with great favor.

POLYPUS IN THE MIDDLE MEATUS.

In answer to the question regarding the removal of polypi in the middle meatus, it should be acknowledged that in the past no operation in surgery has been less efficient. These polypi usually arise as a result of secretion from the frontal sinus or ethmoid cells or maxillary sinus. The secretion irritates the membrane, and causes it to proliferate. This further obscures the escape of the secretion, and results in a development of polypi which usually originates at a point which can not be reached without the removal of the middle turbinal and the exposure of the hiatus semilunaris.

It has been the author's lot to work in this field before Luc and Grünwaldt produced their instrument to facilitate work, and it may not be without profit to exhibit an instrument which has served many years in the removal of the middle turbinate, and at the same time all the polypi which infest the region, short of opening the sinuses.

This forceps is called "middle turbinal or bridge forceps." I recently had it made in two sizes, the larger of which will remove the entire anterior portion of the middle turbinal. The use of this form entirely supplants the snare, and it is believed that it has sufficient merit to compensate for the space it may occupy, which is not true of all modern instruments.

A further thought regarding nasal obstruction is the turgescence due to diseases of the accessory sinuses, sight of which must not be This may be illustrated by reference to a case of polypus. The growths pervaded on both sides, and were removed together with the middle turbinals, under a general anesthetic. right side the obstruction was entirely removed, but on the left, it was found that the patient could not breathe well. This was partly accounted for by the fact that the septum encroached on that side, but the main source of the obstruction was found to be due to the secretion from the frontal sinus, which kept the entire mucous membrane in a swollen condition. Persistent pain was complained of over the left frontal region. It was decided to insert a gold drainage tube into the sinus, after the Ingals method, which was done. This rendered the discharge free, and under improved drainage, the quantity diminished, and the character improved. Free drainage or a radical operation is recommended as a remedy for the swelling which may prevail in conjunction with the empyema of the accessory sinuses of the nose.

In closing, it seems desirable to say a word regarding the obstruction due to malignant growths. During the past year, three cases have presented themselves, which have served to modify my opinion on this subject.

First, that of Mrs. S., aged 30, a bleeder, suffering from complete obstruction due to a growth in the right side of the nose. Several attempts had been made to remove the growth, but nothing was accomplished on account of the alarming hemorrhage. The history led to the belief that it was a malignant growth, and the fact was explained to the husband. An operation was undertaken with faint hope. It was found to be a soft sarcomatous growth, filling the maxillary antrum, having completely obstructed the inferior and middle meatus. Owing to the profuse hemorrhage, the operation was made as rapidly as possible, and the cavity packed. In a month the nose was filled with the same growth, and respiration, which, after the operation, was free, was entirely obstructed.

Believing that the x-ray would be useless in such a case, it was recommended purely to postpone the fatal sentence. To my surprise, in two months the patient developed a breathing space which increased from day to day, until the growth entirely disappeared, and to-day she is a well woman.

Second: Mrs. H., wife of Dr. H., developed a growth on the left side, which proved to be a round-celled sarcoma, involving the septum and palate bone. Under the same treatment, in spite of operative procedure and x-ray application, the condition was not influenced, and she is now on her death bed, after months of suffering.

Third: Mrs. N.; upon presentation a diagnosis of sarcoma was made, involving the septum and outer walls of the right side of the nose. Excision of the inferior and middle turbinate was first resorted to, and then the septum and side walls of this space were thoroughly cauterized. The x-ray was again resorted to, but had to be fortified with the galvanocautery. The case is doing well after six months.

In the past, I have relinquished these cases after a feeble fight against what seemed an unmerciful destiny, but since having an experience of 50 to 60 per cent. of success, I shall in the future put up a more vigorous fight with the most improved x-ray coil.

If the sinus is involved, one should consider himself in the position of a drowning man, and fight the enemy with cautery and x-ray coil after freely opening and curetting the sinus or sinuses which might be involved.

PATHOLOGIC CONDITIONS OF THE NASO-PHARYNX IN THE ADULT.

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CHICAGO.

Ever since the publication of the memorable paper by Hans Wilhelm Meyer, in which he announced the pathologic importance of adenoid growths in the naso-pharynx, attention has been directed to this field, and during succeeding years there has been manifested a progressive appreciation of the value of the discovery and of the importance of removing these obstructive growths which, if allowed to remain, are so likely to induce the development of either otitic or systemic disturbance which may so seriously impair the vitality of the patient or so unfavorably influence his future welfare in so many ways.

The posterior rhinoscopic examination is often quite unsatisfactory, even in a patient with a tolerant throat, owing to the smallness of the opening leading to the naso-pharynx when the soft palate is fully relaxed. The uvula is also at times broad or enlarged so a view must be taken from either side thereof. In such cases a very small rhinoscopic mirror, even a No. 00, may be required, though of course the smaller the mirror used the less light is reflected, and the smaller the field exposed, hence a complete view is obtained only by successively examining the several points of interest. By using as large a mirror as the patient will tolerate the illumination is proportionately intensified.

The angle at which the mirror is bent upon the handle is also a point to be considered, and the more abrupt it is, up to nearly a right angle, the better the view obtained of the lower portion of the choanæ, while to see the vault to the best advantage an angle more extended serves to a much better purpose. In order to fill the varying requirements a tilting mirror, the angle of which can be regulated by a spring thumb lever, is almost a desideratum. I use one of the Michels pattern. The patient should be directed to close the eyes and breathe steadily through the nose while the tongue is firmly pressed downward with a tongue depressor. Sometimes this can better be done by the patient in order to avoid gagging.

For several years I have been employing a procedure whereby a better view can be secured in certain cases, wherein the anatomical formation permits, and in which the examination as usually made is unsatisfactory owing to the narrow opening above alluded to. I direct the patient to turn on the chair to the extent of 90 degrees,

so one shoulder will be turned toward me, when, without changing the position of the body, the head only is rotated frontward to the maximum degree as I make the examination. By tortion thus secured the naso-pharyngeal opening is changed from an oval to triangular shape, with the base thereof at the rear, and into this widened base I so place the mirror as to obtain an excellent view of the opposite half of the naso-pharynx. By reversing the position of the patient the other side can in like manner be examined. In this way I can often use a larger mirror than would be tolerated when the usual method is practiced. Furthermore, as the mirror is also further away from the point of observation, a larger field can be seen. This procedure is well illustrated in Figure A. While employing this method a soft palate retractor is never required.

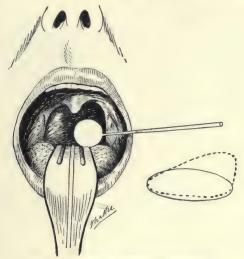


Fig. A .- Lateral posterior rhinoscopy.

In order to obtain a better view, when the examination is being made from the front in the usual manner, it is not infrequently desirable to use some form of soft palate retractor. Latterly I have been using my compressed air aspirator, as shown in Figure B, which is of particular value when the uvula is enlarged. During this procedure the patient must handle the tongue depressor.

There are, though, cases at times encountered wherein gentle means are of no avail, when I employ a method which I formerly described in a paper entitled, "Pharyngeal Adenoids," which was published over seven years ago. The introduction of a small rubber tube through one nostril, and then out of the mouth, so, after

^{1.} Medical Monograph, February, 1899.

sufficient stretch has been given, the two ends are tied in a bow-knot over the upper lip, has been frequently shown, and by different writers. I have never been able to obtain any satisfaction from this method for different reasons:

First—The rubber tube, owing to its size, occludes the inferior meatus in one nostril so as to preclude a simultaneous anterior examination of that nostril.

Second—The bow-knot is highly unsatisfactory as the knot slips, and furthermore soon becomes foul and slimy from either blood or nasal secretions.

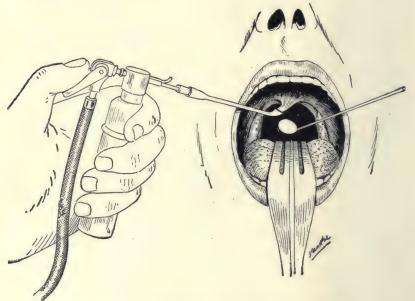


Fig. B .- Pulling uvula forward with compressed air aspirator.

Third—The soft palate is so stretched as to make a narrow triangular slit anteriorly which is not an ideal form, in order to give the best results.

Fourth—It is excessively disagreeable to the patient who can neither expectorate nor swallow, and the only way to give him a rest or relief is by complete removal of the tube.

With these important and numerous objections it seems strange that different authors for so many years have continued to copy its description from predecessors.

My method is clearly illustrated in Figure C and requires the use of a solid elastic cord 5/32 of an inch in diameter, and about two feet in length. These cords, of different sizes, are employed by the general surgeon as ligatures. I find the next larger size (3/16)

inch) is too large and clumsy, while the next smaller size (1/8 inch) stretches out too fine, so as to be painful when sufficient tension is employed. After suitable cleansing, and while still wet, one end of this cord is passed along the floor of one nostril until it can be seen back of the soft palate, the patient meantime holding down his own tongue, when it is grasped with a forceps and drawn out of the mouth on the same side. Next the opposite end of the cord is passed in a similar manner through the other nostril and out from the mouth on that side so the middle of the cord rests close to the upper lip and against the nasal partition. Lastly sufficient tension is given either end so the soft palate is drawn well

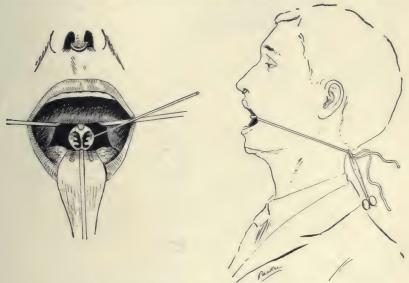


Fig. C.—Use of elastic cord as soft palate retractor.

forward when the ends are passed backward from either angle of the mouth and crossed at the back of the neck, where they are securely locked by a strong scissors artery forceps.

When the cord is thus applied the nose can be easily blown and cleansed, and the mouth can be tightly closed. Even though spasmodic action of the soft palate is induced, it will soon subside under the elastic pressure, owing to the much greater length of cord employed than by the antique method previously alluded to. As one end is drawn to either side of the mouth the anterior edge of the naso-pharyngeal opening, instead of being V-shaped, is shaped more like a U, with a flattened bottom, which gives far more room for either examination or operation. Furthermore, when the soft palate tires from the tension, or when the patient desires to swallow,

all tension can for the nonce be removed by the patient simply pulling forward upon the cord when grasped over the cheek by a hand on either side. Soon as this hold is released the elasticity of the cord is again operative and the soft palate is held forward as before. This interruption can to a large extent be avoided by the use of a dental saliva ejector or other aspiration device. Personally I prefer my tongue depressor with saliva ejector attached (Figure 1).

Lastly, while in position with the stretched cord in either nostril, so slight a portion of the area of the opening is encroached upon that an anterior examination with a nasal speculum can be made at any time. This described method of retracting the soft palate is of in-



Fig. 1.—Tongue Depressor with saliva ejector (1/4 size).

estimable value during major operative procedures in the naso-pharynx.

The adenoid growth or enlarged pharyngeal tonsil, when not removed, passes through much the same atrophic evolution as does the faucial tonsil in its change from hypertrophy to submersion. In its destruction by Nature's process there follows a sort of flattening out whereby the normal concavity of the vault of the pharynx is so filled that it presents a flattened or plane surface instead of the normal curve, which should be easily recognized by posterior rhinoscopic examination, though, as there remains no protrusion, the flattened surface may be regarded as normal by the examiner unless his attention has been particularly directed thereto. By this examination the m. m. of the naso-pharynx will generally be found to be more red than normal, and not infrequently

there will be resting upon this flattened surface some visible inspissated secretion. The patient usually reports the presence of a post-nasal catarrh.

With the mirror in proper position, if the examiner will pass through either nostril near the floor a delicate applicator, the end of which is tightly wrapped with a small tuft of cotton, he will find that the cotton wrapped end of the applicator can be easily made to enter to the extent of about one-fourth inch into the soft tissue, which causes the vault of the naso-pharynx to be flat as described. While the pathologic tissue alluded to may not be so much as one-fourth inch in depth, the applicator will enter to this extent as it is inserted at an angle to the surface thereof. In this way the diagnosis can be easily confirmed. In certain cases wherein this condition is present there will be observed one or two vertical slits which have been named pharyngeal bursæ or Luschka's crypts. It seems to be a self evident proposition that these bursæ or crypts can only exist when there is present the degenerate adenoid, and that no such depressions can ever be found in or upon the normal smooth mucous membrane covering the vault. These bursæ, when present, serve, like tonsillar lacunæ, as a resting-place or exit for malsecretions.

In our standard text-books but rare and brief allusions to the fossæ of Rosenmüller are to be found, at least as regards any pathologic import they may have. Attention is called to synechiæ or web-like strings reaching across from the tubal prominence to the pharynx, and as when they exist they retain secretions and have an uncanny look, it is suggested that they be destroyed. At the meeting of this society last year a paper was presented by Dr. Thos. L. Brunk,2 in which he gave the results of his investigations of these fossæ and reported favorable results obtained in many cases by a thorough curettement thereof, when abnormally shallow, that is, when not possessing their normal depression, owing to a deposit of soft granular tissue which is easily removed by the fingernail. During the operation the patient generally experiences a crackling sensation and hears the breaking down of the spongy tissue. This condition of the fossæ is often observed in patients who complain of stuffiness of the ears, impaired hearing, tinnitus, and hoarseness.

'The purpose of this paper is to call particular attention to these two locations which are so often a resting point for soft or friable deposits of degenerate tissue, the pathologic nature of which is clearly proven by the prompt cessation of unfavorable symptoms

^{2.} Transactions Amer. Acad. Otol. and Oto-Laryn., 1905.

after its destruction. Other abnormal conditions of the nasopharynx will be cited, though their correction is fully indorsed by all authorities.

Pharyngitis hypertrophica lateralis is a condition quite often observed in which an enlarged band at either side of the pharynx just back of the posterior pillars is present and may extend upward considerably beyond the point of attachment of the soft palate. The m. m. covering thereof is generally more red than normal, and both wrinkles and bulges forward when the patient gags. Their irritated condition is frequently proven by the patient acknowledging discomfort when they are touched by a probe. Granular pharyngitis is considered in all text-books. In the writer's experience it is more symptomatic than real, and is always due to other troubles which, when corrected, cause a fading away of these granules, hence no special treatment thereof is required.

The anterior boundary of the naso-pharynx consists of the choanæ with the intervening septum and the posterior ends of the turbinals upon their outer borders. In order that the respiratory functions of the nose are not interfered with, these choanæ should possess certain features the same as required in the normal nasal passages. No hypertrophied condition of the parts should be present whereby drainage or breath way are obstructed, or whereby the course of the passing air current is deviated from its path. When these desired features of structural formation obtain the mucous membrane is of the normal pink color and no retained secretions are visible; furthermore, no two opposing surfaces touch each other.

One form of hypertrophy not infrequently observed is a pale bulging on one or both sides of the vomer near its posterior end and opposite the posterior end of the opposing middle turbinal. These growths are chiefly detrimental through their deviating the course of the air current, which has been thought by one writer to be a common cause of tubal catarrh as the incoming air current is thereby caromed against the Eustachian prominences so as to be both irritating and drying.

Aside from such deviation of the air current these growths, by diminishing the area of the choanæ, serve like any other obstruction at this point as a producer of alternate rarefaction and condensation of the air in the post-nasal space, and are thus harmful.

Enlargement of the posterior end of the middle or inferior turbinals is another condition quite often observed, and while such enlargement may be acute and hyperemic, it is more often a true hypertrophy, having at times the appearance of polypoid degeneration, and, like similar conditions of the soft parts in the

nasal passages, yields a more or less excessive and often tenacious secretion, which generally passes for post-nasal catarrh.

Lastly, the choanæ are at times obstructed by nasal polypi, usually myxomatous, though occasionally there is found instead a so-called fibrous polypus. In fact, fibroma may grow from most any point in the post-nasal vault. In this paper these two latter conditions will not be considered.

Any obstruction of the choanæ has an unfavorable effect upon the voice and requires the vocalist to make a greater effort in order to attain the desired note. Such increased effort or straining of the voice is an undoubted factor in the production of those laryngeal troubles so often found in the vocalist.³

The operative procedures required in order to correct the several conditions enumerated are comparatively simple for one familiar with rhino-laryngologic manipulations.

The hypertrophied lateral bands of the pharynx are best destroyed by parallel linear incisions made with the galvano-cautery point, which is painless with local anesthesia. During the operation



Fig. 2.—Naso-pharyngeal curette (2/5 size) double cutting edge.

it is desirable that a soft palate retractor be employed, the patient meantime holding his tongue down firmly with a tongue depressor. By having a rhinoscopic mirror in position the operator can easily locate and guide the cautery when above the velum. For patent reasons the incisions are best made from above downward.

For removing the soft and degenerate adenoid tissue in the vault the ordinary adenoid curettes are not suitable. I have for some time been using a special curette⁴ with double cutting edge, whereby the vault can be easily cleared. During its use it is better to retract the soft palate while the patient holds down his tongue with a depressor. Under local anesthesia no particular pain is complained of, and, as this is a condition peculiar to adults, a general anesthetic is never required. In order to anesthetise the field I pass a cotton wrapped applicator through either nostril so the cocain rests against the tissue to be operated for about ten minutes. Lastly, just before operating, I make a further application of the anesthetic, usually a 10 per cent, solution, by use of a post-nasal applicator. I might here add that each of my different per cent.

^{3.} Pynchon: The Alkaloidal Clinic, April and May, 1899.

^{4.} The Laryngoscope, February, 1905.

solutions of cocain contain one-half as much phenol as there is of the cocain, which seems to intensify the anesthetic effect and tends to also diminish systemic intoxication. Furthermore the solutions so made will keep indefinitely and the antiseptic quality of the phenol is of undoubted advantage.

For many years I have had in my outfit a Meyer's ring curette of the original pattern, which is straight and has only one cutting edge. Some time ago I had the previously dull back made sharp and the end given a slight bend. With this instrument passed through the nose these described growths could be easily removed, though I have not put it to use as the previously described curette



has always seemed to be the preferable instrument. In a patient with roomy nostrils and an extremely sensitive throat this latter described modified Meyer's curette might prove to be the instrument of selection.

For curetting the fossæ of Rosenmüller I have found no instrument to be the equal of the finger-nail. In operating the patient's right side I use my right index finger, and for the patient's left side the index finger of the corresponding hand. While operating the cheek of the patient is pressed between the teeth with the operator's middle finger, as the head is firmly held with the opposite arm, the same as when introducing the finger into a child's postnasal space for diagnostic purposes. In this way my method differs



Fig. 4.-Nasal cautery electrode (full size).

somewhat from the plan followed by Dr. Brunk. After cocain anesthesia I have found that the patient rarely regards the procedure as being particularly annoying. Following the curettement the wounds should be gently massaged a few times with a 40 gr. solution of argentum nitras.

For the destruction of soft posterior hypertrophies either side of the vomer the galvano-cautery is all sufficient. After anesthesia the cautery electrode (Figure 4) is passed through the anterior naris of one side and its point is properly located by use of the posterior rhinoscopic mirror. The proper distance to enter the electrode can be roughly ascertained by first introducing a cotton wrapper applicator to the hypertrophied point as seen by the post-

rhinal mirror, then, by grasping the applicator even with the tip of the nose, the distance back therefrom to the hypertrophy can be measured, when, by laying the applicator upon the electrode, the approximate point, which should be even with the tip of the nose, can be noted, or even marked by the placing of a small elastic band upon the shaft of the electrode, which is introduced, tip down, and then when far enough in is rotated up against the hypertrophy. Generally two short parallel linear incisions are required.

For operating the posterior hypertrophied tips of the turbinals either the same cautery point may be employed, or still better, the hot snare, if the loop can be made to engage the bulging end. For an anesthetic some one of the substitutes for cocain, as alypin, had better be selected, as cocain often causes too much contraction of the point to be operated so it will not so readily engage the snare. The distance the snare should be entered can be ascertained as before described by use of the measuring cotton applicator. As the snare loop is much more bulky than the cautery point, therefore causing retching, it must be employed without the help of the post-



Fig. 5.—Tubular shears (1/3 size).

nasal view. By having a slight bend in the canula the loop can generally be coaxed to engage. A hot snare takes a quicker hold without slipping than does the cold snare, and additionally gives the advantage of both cautery destruction and contraction. Furthermore the danger of hemorrhage is reduced to a minimum.

While I have employed the hot snares in the manner outlined upon many occasions without unfavorable results, there have been reported cases wherein an otitis media has followed the use of the cautery in this region, hence a preference is expressed by some for the cold snare, while others advise a cutting operation. Never having found a cutting instrument for this purpose which gave promise of efficiency, I have recently had constructed by F. A. Hardy & Co., of Chicago, a tubular shears which I think will fill the several requirements. By its use a considerable portion of the posterior hypertrophy can be amputated. In fact it can also be employed while operating the depending portion of the anterior hypertrophy of an inferior turbinal. When used in operating a posterior hyper-

trophy its proper position can be secured by having a finger in the post-nasal space. When more than one post-nasal operation is required it is wiser to allow a few days to intervene between the succeeding attacks.

After removal of all pathologic tissue in the naso-pharvnx as described the m. m. lining thereof will soon assume the normal pink color of health unless there are remaining pathologic conditions of either the nasal passages or the faucial tonsils, either or both of which will contribute toward keeping up an irritated condition of the naso-pharyngeal m. m. Good results are invariably obtained by operating any or all of these alluded to conditions when found. I have been much impressed with the great benefit derived from curettement of the fossæ of Rosenmüller when filled with soft tissue as described. In several cases there has promptly ceased a sensation of fulness of the ears as complained of by the patient. Tinnitus has frequently been improved or eventually cured, and in one case, within twenty-four hours, with no recurrence to date, the operation having been done six months ago. Equally favorable results have followed curettement of degenerate adenoid tissue, particularly in the way of correcting unfavorable otitic manifestations, while asthma has been as promptly relieved by the hot snare removal of posterior turbinal hypertrophies.

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DISCUSSION

ON PAPERS BY DRS. PRINCE AND PYNCHON.

Dr. Norval H. Pierce, Chicago, referring to Dr. Prince's remarks regarding anesthetics, said that he is coming more and more to adopt deep anesthesia in operations on tonsils and adenoids to enable rapid operation. The anesthesia should be carried to the point where the pharyngeal reflex has entirely disappeared. Though it requires much more time for a patient to recover, yet the thoroughness with which the operation can be done and the lack of gagging and the disturbance of respiration far outweigh the difficulties of prolonged recovery.

Dr. Dundas Grant, London, Eng., said that Dr. Prince brought up some very interesting and intensely practical questions not so sensational as some of the others, but well worth consideration. He agreed with Dr. Prince that in a large number of cases it is necessary to remove the posterior extremity of the inferior turbinate in order to get the desired results. He himself had failed from this not having been done. As to whether it is wise to operate on both at the same time, of course, it would be desirable only to operate on one if only one required it, and it is very often the case that only one requires it. It seems that is the rule. And it is the left one very much more often than the right. With regard to the adenoid, there is no doubt it does occur at times, but not so often as supposed. There are various other conditions; there is often a return of the symptoms, if not a return of the adenoid. And one not referred to so regularly by the authorities as it should be, is the projection of the atlas. Frequently he has found it projecting forward and causing obstruction. And that is not the reason for the return of the symptoms, but for the adenoid not having been removed, because most

of the instruments fail to remove it. Quinlan's forceps exactly meet the requirement. In the hospital to which Dr. Grant is attached a large number of these operations are performed with the patient in a sitting posture, and that method of doing it is increasing very much. There are objections to it, but as a rule the advantages outweigh the objections. Dr. Grant praised the forceps that Dr. Prince had shown for removing the posterior extremity. Doubtless Dr. Prince had made them in accordance with what he had found necessary in practice. The movement he described exactly meets the requirement of the case, because if that little push backward is not made the whole mucous covering of the inferior turbinate may be pulled away. That is not a serious thing, but it is very undesirable.

Dr. Brunk, Decatur, Ill., said that Dr. Pynchon and he had had some correspondence over this question of the fossa of Rosenmüller, and he supposed he had been asked to discuss the paper largely from the fact that he had made some observations on it some years ago, and recorded them in a paper recently published in the Laryngoscope. In looking over the literature he found nothing that showed that these particular pathologic structures in the fossa of Rosenmüller had been observed before, although he had been told that the fibrous bands had been seen by some. Dr. Brunk exhibited a couple of drawings showing the location of these bands and their nature and said that Dr. Pierce of Chicago had claimed that the adenoid tissue often reaches over from the arch or center of the vault toward the outer edge and into the fossa of Rosenmüller. From an extensive experience Dr. Brunk said he did not believe that the adenoid vegetations of the vault are ever found in the fessa. On the posterior eminence of the Eustachian tube enlarged lymphatic glands are found. At least that was what he judged them to be. They do not feel like adenoid tissue; they do not look like it. They are very tough. The forefinger nail makes no impression on them in trying to remove them. Usually he has found but one, but sometimes two or three of these half-bean-shaped hypertrophied glands have been found located in that particular region; in no case had he found them lying in the deep fossa.

He said that the best post-rhinoscope view of the fossa is misleading. It misled him at first some six years ago. At first view in most cases it does not present any inflamed color to the mucosa. Dr. Brunk mentioned a few cases which had a beefy-like appearance. In one case he found cheesy masses such as are often found in the tonsil. But such cases are comparatively few. The misleading appearance of the fossa may account for the fact that the literature contains so very little concerning it. Adenoid tissue is found largely in the vault of the naso-pharynx only, while in the fossa of Rosenmüller there is at the bottom of each, in nearly every case, a soft granular bleedy tissue. He believed it is adenoid tissue, although he had not examined it microscopically. It is a very hard thing to get hold of as it comes away in operating in such small fragments that they are readily lost. Nature seems to have tried to heal over this granular tissue by the formation of synechiæ or bands. Referring to the drawing, he said it was an ideal, showing but four bands. There are from one to seven or eight bands crossing the fossa.

Another matter: Recently he had his finger in a doctor's naso-pharynx in which this eminence or lip, as it is sometimes spoken of, comes up to a sharp edge, and projected outward into the naso-pharyngeal cavity right over the fossa behind it (referring to drawing), so that the finger went into the fossa with considerable difficulty. Several times he had found these sharp projecting lips and he thought that people having that peculiar construction are more inclined to have ear troubles than those who have a low, more rounded and flattened posterior wall to the eminence. There is much to be studied yet along that line. It seems to cover up the fessa and retain

microbic infection. He was sorry he had not time to discuss more of the points in Dr. Pynchon's paper and also some in Dr. Prince's paper.

Dr. George W. Spohn, Elkhart, Ind., referring to Dr. Prince's scissors, said he had used scissors very similar to those described. His were serrated, which is a great benefit. There is a great deal of hemorrhage in enucleating tonsils, if the work is done thoroughly. Those who say they have no hemorrhage do not remove all the glandular tissue. The operation is not complete if a portion of the glandular tissue is allowed to remain. The fibrous tissue sometimes extends into the glandular tissue; and in such cases hemorrhage is liable to occur. The tonsils are glands, and when diseased should be removed in toto. To avoid hemorrhage Dr. Spohn uses the serrated scissors, which act very much as a snare, to close, or compress small blood vessels. If Dr. Prince's scissors were serrated he should like them very much better. If he understood Dr. Brunk correctly that speaker made the assertion that the adenoid tissue of the postnasal region is fibrous and not of a glandular This, said Dr. Spohn, is not the prevailing opinion. Authorities and investigators generally agree that the adenoids belong to the glandular ring (Waldeyer ring), and the only cases in which the "third tonsils" are of a fibrous nature are the old and atrophied cases in adults. When tonsillar tissue becomes fibrous it rarely causes any trouble. Everybody has a pharyngeal tonsil, but not a diseased tonsil.

A MEMBER, referring to the prejudice against the removal of the tonsils, said that the prejudice arises almost entirely from a fear of interfering with the voice. When that fear has been overcome patients are more tractable and will allow the removal of the tonsils. As to the method of reducing hypertrophied structures it depends on the nature of the hypertrophies. Concerning the return of the adenoids he said that in his own list of 200 cases he had not had 2 per cent. returning adenoids, and he had followed

out many of these cases very carefully.

After thorough curettement his method of procedure is to apply daily with a ball of cotton wound on a nasal applicator nitrate of silver solution, at first gr. xl to lx, thoroughly rubbing it in. He follows this up with a daily treatment for every three days to ten, depending altogether on the excretion and condition of the wounded surfaces. Since trying this method he had had no trouble. He does not use a strong solution of silver after the first application, but 10 gr. solution daily. He uses massage very forcibly, oftentimes being told that the treatment was even worse than the growth of the adenoids, which fact, nevertheless, does not deter him from continuing as long as he has such good results. If the excretion is profuse he uses sometimes the No. 1 or No. 2 Sales iodid of potassium crystals in lieu of the nitrate of silver. The massage of the postnasal space after the removal of the adenoids with this solution, is, he believes, a great factor in preventing a return or the bidding of the new lymphoid tissue. Besides, it is often surprising to find the large adenoid growth that is removed. As far as the technic is concerned, that is different in different cases, whether an anesthetic is given or whether it is done with local anestheia.

Dr. Edwin Pynchon, Chicago, said that in his paper under the head of treatment he recommended the use of the hot snare for removing the posterior ends of the turbinals. That is his usual custom in adults. There is a prejudice on the part of a great many against the use of a heated electrode in the maso-pharyngeal space on account of the danger of producing tubal inflammation, and they prefer cutting instruments. There is a deficiency in instruments for this purpose. It occured to him to try his hand at something in that line, particularly as some operators are so much in favor of cutting off the posterior ends of the turbinals. Dr. Ingals followed this practice more than any other writer Dr. Pynchon knows of, though he uses so large a forceps that it seems almost cruel to introduce it into

the nostril of a child. In working out this problem it occurred to Dr. Pynchon that if he were to make what might be called a trephine shears it would meet the requirements. He has just had the instrument finished and believes it will be very efficient. When open it does not occupy as much space as when closed. It is to be introduced while the finger is in the postnasal space so as to know when it is properly located, and so as to get the fenestra in such position that the hypertrophied end of the turbinal will enter the groove after which the inner blade is made to revolve and cut it off. After the cutting is done is the time to give the little push that Dr. Prince recommends.

In regard to the aspirator Dr. Pynchon said he intended to describe it in his presentation of new instruments, but his time was too brief. The aspirator operates by the use of compressed air, wherein it is different from hydraulic aspirators or saliva ejectors. The compressed air cut off is attached and as the air escapes suction is produced, when the instrument can be used as required. When it is desired to clear blood out of a wound, the long tip is employed and the blood instantly disappears. In case of suppurative otitis media, or after a peracentitis the ear tip is introduced and the air current turned on. When removing blood from a wound it may become stopped by a blood clot. In such event by closing the air exit with the finger the negative is instantly changed to positive pressure, which cleans out the tube. The great advantage of a compressed air aspirator over a water aspirator is the fact that it can be absolutely and positively controlled, because it is regulated by the pressure that escapes through the tube from the air tank, as indicated by the meter. Dr. Pynchon said that when he puts on full pressure at the office, which is about forty pounds, he gets a five-inch elevation, according to the vacuum gauge, and can regulate the valves in such a way as to get as low as only one inch, which is very weak, therefore he can absolutely control the power of suction. If one wishes to draw the secretions from the Eustachian tube after having introduced the Eustachian catheter, by turning on the air current, it gives suction. It is applicable in any case in which aspiration would be of use.

CEREBELLAR ABSCESS FOLLOWING ACUTE SUPPURA-TION OF MIDDLE EAR. OPERATION. DEATH. AUTOPSY.

W. D. BLACK, M.D. ST. LOUIS, MO.

While the subject of cerebellar abscess is not new, I believe that the reporting of cases to a general society often brings out many new points in the discussion. Cases which result favorably often give the author or operator more satisfaction, but less real knowledge than those which terminate fatally, when an autopsy is allowed. This case that I will report, has many points of special interest and I earnestly hope the discussion will be general, so that all of us may gain additional knowledge of a still imperfectly understood subject.

History.—Oct. 18, 1905, was called in the southern part of city to examine patient, who was a boy 14 years old, color white, of

medium build, with a history of having had no constitutional disease with the exception of neuralgia and severe cold in the head, which caused acute suppuration in his right ear, and which existed for two weeks, followed by recovery. This was about one year prior to the present illness. The present attack had existed about four weeks before I saw him. The attending physician called me because of the boy having a headache on the right side. The pain was very severe, being first noticed above the ear and radiating to the frontal region. The physician informed me that the patient had from one to two degrees of fever at first, but when the ear began discharging the temperature fell to normal. When I first saw him the patient had been vomiting for several days, and complained of vertigo on moving. The pulse ranged from 60 to 70, full, strong and slightly irregular, missing a beat occasionally. Pain in the head was almost constant and more noticeable in the frontal region. Bowels regular, but a tendency to constipation. Patient drowsy and sleeping most of the time. Later the attendants found it more difficult to arouse him than when he was first taken ill. No delirium.

Examination of Patient.—No tenderness or swelling over the mastoid region. Walls of the external auditory canal swollen, making it impossible to see the tympanic membrane, and a furuncle developed, partially blocking the lumen of the canal. The auricle itself normal. Discharge from canal small in amount and very offensive. Patient was very ill and I omitted the customary test for hearing. Loud conversation could be heard, but not very well. The attending physician and myself strongly suspected intracranial complication, but decided to wait a day or two and treat patient on the expectant plan. Ordered an ice bag to the head and hot carbolized douches with fountain syringe for ear, to be used every three hours. At the expiration of twenty-four hours the patient seemed better; swelling of the canal wall much less. Pain about the same. Discharge from the ear a little more profuse. General condition worse. Decided to perforate the tympanic membrane and an anesthetic was given. Made a crucial incision in the membrane, scarified canal walls, opened the furuncle, packed lightly and applied heat externally. Next day the discharge was greater in amount, with little odor, and the canal walls almost normal. General condition worse, although vomiting ceased for a time. Examination of the viscera showed that they were normal. Urine decreased in amount, showing a trace of albumin and a few granular casts. Intestine more difficult to move, with a tendency to impaction. Examination of the eyes showed no strabismus, pupils reacted normally, no fundus changes. No rigidity of muscles of neck and no retraction of head. Slow cerebration. This latter symptom was very marked. We were now almost positive we had an abscess to deal with and advised operation. Parents agreed, and the patient was taken to the hospital. This was five days after first seeing the case.

Oct. 22, 1905. Patient prepared in usual manner and a Swartz-Stacke operation made. Found entering the antrum quite difficult owing to the compact bone, although it was not sclerosed. Antrum contained three or four drops of pus. The walls of the antrum were apparently healthy. I now worked backward, enlarging the opening, and exposed the sigmoid sinus for two-thirds of an inch. Found sinus of good color, compressible, and from the healthy bone around it concluded that opening it was unnecessary. General symptoms did not appear like those you expect to find in sinus thrombosis. The next step in the operation was making an opening 11/4 inches in diameter, 11/4 inches behind and 11/4 above the external auditory meatus. Dura of good color and brain pulsating normally. Incised dura almost the entire width of opening and inserted trocar and cannula in every direction to a depth of from 1 to 21/2 inches, especially along the tegmen tympani, but found no pus. Inserted a small piece of selvage edge gauze within the cerebrum for about 2 inches. Upon the urgent solicitation of the attending physician the dura was left open. Carefully packed the brain wound from the mastoid opening, then brought edges of latter together and stitched, leaving the lower 1/4 inch open for drainage. The patient's condition at this time was not good, and it was decided to delay opening the cerebellum for a day or two. The patient was put to bed and stimulants given. Time of operation was two hours, the delay being caused by having to work with coal oil lamp. The temperature the next three or four days ranged from 98° to 98.4°. No vomiting. Pulse regular, 76 to 78. Respirations, 18 to 20. Removed the wick from the cerebrum and dressed the mastoid wound on the second day. Wound looked healthy. Brain substance protruding slightly through opening in skull. No pus in either wound.

October 25. (Three days after operation.) Pulse 74, good; no irregularity. Respiration 18, no vomiting, no headache, tongue clean, facial expression good, patient answers questions readily and hears low conversation. For the next seven days improvement was marked and all organs functionating normally. Patient stated he felt well enough to go home. Wound dressed every other day. Brain prolapse grew to the size of a walnut and then became stationary. About the thirteenth day after operation the patient became restless and all the symptoms which existed prior to operation returned.

Wound looked healthy but prolapsed brain tissue began to soften and break down. Owing to the patient's improvement we began to doubt our original diagnosis and thought we might be dealing with a case of serous meningitis, but with the return of the symptoms we determined to relieve the brain prolapse first and then explore the cerebellum.

Operation for Brain Prolapse.—November 6. (Fifteen days after first operation.) Split scalp for 1/2 inch above upper edge of wound and extended toward the bregma. We next broke the adhesions which existed between the brain tissue and that of the scalp, which, by holding the brain prolapse from protruding still farther, caused the return of symptoms by not allowing the relief of intracranial pressure. Tied off the brain prolapse as close to its base as possible and cut with scissors. Cut a small artery which was difficult to ligate, but succeeded in controlling hemorrhage by suturing the periosteum, then cutting out the small pieces of periosteum, then cauterizing with actual cautery. I now cut a piece of silver screen slightly larger than the opening and placed it in position, using as little force as possible. Next made a flap of periosteum and cellular tissue on each side and sewed them together, leaving a small opening at the lower angle of the wound, then brought the muscular tissue over this and stitched. Time, one hour and five minutes. While I was preparing to make the opening for the exploration of the cerebellum the patient gave a peculiar gasp, a kind of long drawn sigh, when respiration suddenly ceased. It seemed like a sudden paralysis of the diaphragm. Artificial respiration performed. Pulse fast and weak. Hypodermoclysis given, heart stimulants used, and patient put to bed. Artificial respiration was used continuously, although breathing had ceased entirely, and this procedure was kept up for six hours, when cardiac action ceased.

Postmortem Findings.—Cerebrum: Dura everywhere injected, but found few adhesions. Sections made in all directions and medulla and pons cut in small transverse sections. At the site of the opening in the skull the brain tissue was softened, otherwise the cerebral tissue looked normal. The lateral ventricles were apparently larger than normal and contained considerable serum.

Cerebellum: On making an incision in the right lobe of the cerebellum an abscess about the size of a hickory nut was discovered, containing about one-half ounce of thick greenish and yellowish pus and situated about the center of the right lateral lobe. It seemed to have no connection with the lateral sinus.

In conclusion there are a few points of interest I would call your attention to:

- 1. Mode of infection. I believe the infection occurred through the lymphatics as the sigmoid sinus and the osseous walls around it were healthy.
- 2. Doubt of correctness of original diagnosis after first few days following operation. All previous symptoms disappeared and only returned when brain prolapse became adherent to surrounding tissue.
- 3. Rarity of cerebellar abscess in acute suppurations of middle ear in children. This is very uncommon and when it does occur is usually from direct extension of infection backward.
 - 4. Kind of infection. Bacteriologist made no report.
- 5. Cause of death. Compression of brain due to the closing of the opening, thereby increasing the already great intracranial tension, causing paralysis of the center of respiration.
- 6. Silver fillet in brain surgery. The use of this in my opinion not advisable owing to the difficulty of placing it in position and also owing to its wide meshes allowing the brain tissue to protrude.

DISCUSSION.

Dr. Percy Fridenberg, New York City, referred to a report which was made at this year's meeting of the German Otological Society of the clinical (?) statistics of a large number of just such cases as Dr. Black had reported here; cases with cerebellar abscess following. Some of the cases were acute, others chronic. The case history and autopsies included the microscopic examinations of the entire temporal bone. The examination of the temporal bone is not included in Dr. Black's report, and it is possible that this might have thrown some light on the mode of infection of the cerebellum. In less than 50 per cent. of iotitic brain abscesses was a sub-dural abscess found. The more usual sort of infection was through the inner ear, either through the internal meatus or more frequently by direct infection through an empyema of the saccus endolymphaticus. As the doctor especially states the sinus was examined and no pus was found, the possibility of infection through the inner ear must be remembered against the rather hypothetical one of infection through the lymphatics of the sinus.

A member said that the report of the postmortem is not a fair indication of these instances, as it might have been made. In all these cases an examination should be held and the class of the infection ascertained. There are three methods by which infection through the middle ear and intracraneal cavity takes place, and he did not know whether the statistics given by Dr. Black are large enough to make the inference certain, namely, that the most frequent class of infection comes through the lateral sinus. As a rule the class of infection can be detected. In all these instances the surroundings of the brain are to be carefully noted before the brain is removed, and, furthermore, it would be advisable in all cases to remove the temporal bone. He takes great pains in removing the temporal bone, with or without permission, and it is not an easy thing to do that without laceration and abrasion of the external tissues of the skin, which must be avoided. He does it mainly with a chisel. He presented a half dozen specimens of the temporal bone gotten in this manner to the society some years ago. The value of this work lies in the ability to make a differential diagnosis between the abscess of the temporal lobe and between abscess of

the cerebellum. He does not believe that any considerable advance in this regard has been made in the last decade. It was hoped at one time that the percussion method would give considerable aid in differential diagnosis. He was exceedingly careful to use percussion in all cases of that kind for the last six or eight years, and in some instances percussion will aid in the diagnosis. But he could not rely on any large number. He first practiced percussion in the usual way, simply with the finger. Afterward he used one of those little instruments, a so-called dressing needle, which are used in percussion of the larynx, and finally he used a little awl fixed on the end of a pencil, cutting about an inch off here, which seems to work more effectively than any other manner. He referred to one instance which was close, in which the diagnosis of abscess of the temporal bone was made. The use of percussion is rather circumscribed in its area; it was painful in a circumscribed area, while all around it was not painful. In that instance the diagnosis would have been easy and plain, even without the aid of percussion.

Dr. Black, replying to Dr. Fridenberg who spoke of the examination of the temporal bone and the order of the postmortem; said that it was impossible to remove the entire temporal bone, as the relatives would not allow it, and he had a hard time in making a postmortem at all, but if there had been suppuration of the region of the middle ear the abscess

would not have been found in the cerebral region.

As to tests for hearing, Dr. Black said tests for hearing in a noisy place can not be set up, when the child is very ill, especially when the cerebration is so bad, and the mentality is far from normal. Tests would be inaccurate even at best with the normal brain, and tests are at best inaccurate, as Dr. Grant has shown. From postmortems and from other data it has been shown that there is such a thing as infection through the internal os. He concurred in the work of experimentation that has been going on. The proper diagnosis between sphenoidal abscess and abscess of the cerebellum is extremely difficult. Vertigo comes from so many different causes, even from disease of the stomach, that it does not itself indicate much, except when there is a great degree of it added to those suspected symptoms of cerebral abscess. The question of diagnosis is exceedingly difficult to come at. If there is septicemia of the brain tapping will do no good. It would be only a temporary relief as long as the same pathologic conditions existed; the symptoms would soon return.

IS THE SPRAY APPARATUS AN INDISPENSABLE EQUIPMENT OF RHINOLOGISTS?

EDWARD J. BERNSTEIN, M.D.

KALAMAZOO, MICH.

A feeling, which has grown into a conviction in late years, in my practice, that the routine use of sprays in the daily work of the rhinologist was not only useless, but very often, indeed most often, pernicious, leads me to inquire of my confrères if this is not also their own experience.

I am convinced that much of the ill-repute into which the treatment of nasal disorders is so often regarded, is due to the very imperfect training of many men who essay to treat these disorders, fostered by the belief once current that the chief means of treating such ailments was by the use of various solutions sprayed more or less assiduously into the nares. As a detergent, I know that the sprays fall far short of my demands, when viscid secretions are to be removed from the nares. If one uses an appreciable amount of force, one succeeds only in causing increased congestion with more or less bleeding, and after all the secretions still hang. I find a simpler and readier means in the ordinary douche. In simple engorgements of the turbinates, no spray can be applied without, at least temporarily, increasing that condition so that the handker-chief is covered with the bloody discharges. If it be the aim to cause a local bloodletting, then it seems to me we have a more certain and accurate way at our disposal. I often make slight incisions in the mucosa for this purpose.

As to its use for curing pathological conditions, I have my very serious doubts, certainly in my hands. I have no recollection of ever having accomplished anything important with it. There are occasions when it seems desirable to bring medicaments in contact with the entire mucosa, but this is exceptional and not the point I wish to make.

Often we feel the need for the presentation of weak solutions of adrenalin, cocain, menthol, or some oily medication, but I hardly fancy any one believes them curative.

As to its use in laryngeal practice, I feel almost as strongly. Surely very few of our European confrères make use of it. I know my feelings when I saw that they had something to learn and I am sure most of us, who have worked under them, have felt likewise. In answer to my query on this matter, some of our confrères express themselves as feeling its inutility, but confess that as a matter of policy they still use it in certain classes of patients who will not submit to proper forms of treatment, but that is another matter. What we are concerned in, is to enquire of its scientific value. As I said before, it seems to me not only useless but a positive factor for evil, inasmuch as so many hard-headed physicians have become disgusted with the attempt to get any results from patients who get this sort of routine. There is one class of patients in whom I feel that its use is absolutely contraindicated, and is absolutely harmful, and this is those with vasomotor rhinitis.

As to the electro-cautery. For fully ten years it has disappeared from my armamentarium in rhinological practice. I find that the surgical treatment of the septum does away with a large number of hypertrophied conditions, and where I find it necessary to reduce

such, some one of the many cutting devices do it so much more accurately and with infinitely less reaction that I have put my electrocautery in the lumber room.

Wishing to ascertain the position of some other workers in this line I have addressed letters of inquiry to a few fellows of this association, with the following replies:

St. Louis, Mo., June 18, 1906.

Dr. E. J. Bernstein.

Dear Doctor:—In reply to your communication I wish to say that I expect very little curative results from the spray. I think that I have found the spray, when used regularly by the patients themselves, to be of some service in mild chronic inflammatory troubles of the nose.

The electro-cautery has at present a very slight position in the treatment of nasal conditions. I have discarded it in all cases except where the hypertrophy is slight and where I think that pinning the mucous membrane to the bone with the subsequent cicatrization will be sufficient for the case.

Very sincerely yours,

HANAN W. LOEB.

NEW YORK, June 18, 1906.

Dr. Edward J. Bernstein.

My Dear Doctor:—Your circular of June 14 has been duly received. I have never used the spray apparatus in routine treatment, and have always preferred the knife to a cautery.

Very truly yours,

W. Sohier Bryant.

CHICAGO, June 20, 1906

Dr. E. J. Bernstein.

My Dear Doctor:—As to sprays, I am using them very much less than formerly, though I still believe they are of some value in temporary relief of engorgement and in restoring tonicity to the vasomotor areas of the nasal mucous membrane. I do not, however, use the sprays as a routine treatment of my cases as I did formerly.

As to the cautery, I am using it less than I did at one time, not altogether because the cautery is not an efficient means of treatment, but because there are better methods of treatment. For instance, since the submucous resection of the septum has come into such general use, I am enabled to correct deviations of the septum much more completely than I could formerly by other methods of operating, hence I do not find the frequent occasion of reducing the turgescent inferior turbinated bodies I once did. In other words, the respiratory space in the nose is established more often by the

correction of the deviated septum, hence it does not need to be established by reducing the turgescent turbinated bodies by the cauterv. Notwithstanding this, however, I still find frequent occasion for the use of the electro-cautery in reducing the turgescent inferior turbinated bodies. During the last eight or ten years I have on several occasions been asked to take the floor in defense of electrocautery as a rational mode of treatment in certain cases of turgescent rhinitis, the chief objection offered against the cautery having been the great sloughing and reaction following the use. Personally I have not found either very great sloughing or reaction. On the contrary I have found moderate reaction and very slight sloughing. This, perhaps, accounts for my adherence to the cautery as a rational mode of treatment. The difference in the amount of reaction and sloughing is, in my mind, due to the way in which the cautery is applied. For instance, I only cauterized one-third the length of the turbinated body, the incision being superficial. A week later I try the opposite turbinal in the same manner and so on until the entire length of each turbinal is cauterized. In this way I find slight inflammatory reaction and little sloughing.

After all, I find I am not using the cautery as frequently as I did in former years and the reason for it lies in the fact that I am able to correct deflections of the septum much more thoroughly than I could do formerly. Very respectfully,

WM. L. BALLENGER. LEXINGTON, KY, Aug. 18, 1906.

Dr. Edward Bernstein.

Dear Doctor:—I would ask your pardon for my negligence for not replying to yours of June 16, but I am ashamed to. I just found your letter in my batch of unanswered ones, and I am going to write you a line for the sake of old times.

First, I regard the use of the electro-cautery in the nose or nasopharynx both uncertain and unsatisfactory and the after results very frequently serious. I have not used it half a dozen times in ten years. I use the atomizer very little as compared with years ago and seldom allow patients to use it. The average case of nasopharynx trouble in my judgment is amenable to either surgical or systemic treatment and the atomizer habit is as common as the hypodermic and almost as dangerous. Very truly yours,

J. A. STUCKY.

DISCUSSION.

Dr. E. L. Shurly, Detroit, Mich., said that no doubt the spray was used too much and depended on too much formerly, and even now, by general practitioners who want to keep control of their patients. Very frequently he has a patient with a tumor of some sort whom some professional friend

had been spraying for several months or years. Such cases often occur. He believes he had learned when to use a spray and when not, and sweeping generalities are not fair to the subject. A great many affections of the nasal passages are amenable to treatment by sprays which do not need a surgical operation. In this surgical day, however, it is customary to get out an array of instruments and make a great thing of them, asepsis, etc., because all this spectacular arrangement is fashionable. From a financial standpoint it may be a good thing, and a man may get more income than the one who makes an ordinary trachecotomy with his coat and vest on. Dr. Shurly fears there is a great deal of theatricalism in the profession which has no effect in preventing and treating some cases. There are cases in which the spray is perfectly competent as a therapeutic measure; but of course behind the use of the spray there must be brains. There cannot be an automatic spray-rhinologist. He must have brains in order to select the proper thing to use. With regard to the galvanic-cautery, it is a great deal like turning a double somersault. A man should not try it if he does not know how, because he is in danger of breaking his neck. One must learn to use it properly in the proper form, and put it in the proper place or he will have negative results. Dr. Shurly has seen a number of cases operated on by general practitioners or ready-made specialists, men who went to a policlinic right after graduation and then back home and "set up in some specialty. He has seen many instances in which the membrane was not cut deep enough or the right places touched. The moderate or proper use of any of these utilities must be adhered to. Dr. Shurly agrees with Dr. Bernstein that much harm has been done by the use of the galvano-cautery when not properly understood. The same thing would happen in any other department of medicine. He might hate to extract a cataract from an eye, although he could do it, but he should hate to look at the eye or the patient afterwards. The value of any instrument depends on its proper selection and use.

Dr. S. G. Miner, Detroit, Mich., said he felt like Dr. Shurly that every older member of the society would manifest a considerable degree of disloyalty in consigning to the dust-heap these valuable armamentarium adjuncts. The galvano-cautery and spray have done considerable good not only in a financial way but with regard to the welfare of patients. Some years ago every hypertrophic condition of the turbinate bodies, the superior as well as the middle, whether due to thickening of the bone or thickening of the membrane, or simply a vasomotor disturbance producing an intumescence, was treated by the galvano-cautery. To-day it is recognized that the use of the cautery in unskilled hands is apt to be followd by extension of the inflammation in other directions, or some acute affection of a sinus, so it is only employed under the strictest aseptic conditions. But in cases of turgescence, especially those due to vasomotor trouble, or in which there is only a slight degree of hypertrophy, the galvano-cautery produces bétter results than any other line of treatment, especially by the submucous method.

Dr. Dundas Grant, London, England, thought that Dr. Shurly did not intend all that he said to be taken literally, because everybody recognizes that the white gown the surgeon puts on is not merely a covering to express an idea, and he was sure Dr. Shurly would not wish the surgeon to depart from this practice, although he has expressed it in facetious words. There is one use of the galvano-cautery which in the hands of the expert is most important, and that is its use in the larynx. This may seem a dangerous step, but there is no trouble if properly made, and the practitioner is sufficiently dextrous. When the stub is touched and it whitens a little, that is sufficient. It is to be remembered that the vocal cord is at a deeper plane than might be expected. He had found it four inches down. One

would not recommend this to beginners, but it is feasible if properly manipulated. He would not dream of doing away with his galvano cautery for the nose. It is important. In the simple turgescence, which is the cause of extreme annoyance, especially on lying down, not only to the patient but to others, he thought the galvano-cautery should be used. The reason for doing away with it is that great reaction has sometimes followed its use. Every particle of moisture should be dried away, and the cautery should be very sharp and pushed into the mucous membrane. After that, paint over it a little trichlor acetic acid, and then some antipyrin solution, which keeps the turgescence down an hour or two, and tell the patient to go home and spend the rest of the day in dressing gown and take a mixture of potassium bromid. It is making a mountain of a mole hill, but the reaction must be avoided. If that follows, the patient blames the operator. It does not add to the fee to do this, but to the result of the operation. Another thing is the enormous amount of bleeding which sometimes attends the removal of a pseudopapilloma. It is better treated with trichlor acetic acid. For the base of the tongue a knife is better than the cautery. In minor cases the spray is good for cleaning the nose. In cases of hypersensitive rhinitis, it is unfortunate not to let the patient have a spray containing eucain with some adrenalin to relieve him. Dr. Grant uses a bicarbonate of soda spray for cleaning away the little mucus, especially for singers, who come with little hidden spots of mucus, and it is most useful in cleaning this away. The application of astringents is of value at times with the spray.

DR. PYNCHON said that the history of the practice of medicine is one of fads. In 1885 the use of sulphuretted hydrogen gas, with which the colon was filled for the cure of tuberculosis, was a fad. Every up-to-date physician was provided with an aparatus for this purpose. For several years nothing has been heard of this treatment; the bags have rotted. It means that it would not stand the test. That is all there is to it. There was also a time when the use of sprays was the fad of the day. It was adopted by general practitioners as well as by specialists, and has held its own because it has merit. That is the "proof of the pudding." Some criticize the spray because they assume it is to be used for the cure of catarrh. Dr. Pynchon does not use a spray for this purpose. He uses it as a means to attain an end, for the purpose of cleansing the mucous membrane and preparing it for the surgical treatment which follows; the patient may learn to carry this out himself. Its use once a day will not do any good. He advises the patient to keep it up every hour. The cautery has been criticised on account of its having been wrongly used, and has been sidetracked to a large extent. In the old country they use the thermocautery a great deal. Dr. Pynchon thinks the electro-cautery more valuable. He would like to know how the hot snare can be sidetracked, especially in posterior hypertrophy of the turbinates. It is a nice method of destroying enlargements on the septum, whether on the posterior end of the vomer or anterior to the middle turbinal.

DR. BALLENGER said that he remembered at the meeting of the society at Cincinnati some six years ago, when this subject was under discussion, every one who spoke had practically abandoned the use of the cautery. At that time he defended its use in turgescent rhinitis and some other diseases, and made the statement that some day, when some prominent rhinologist devoted a paper to the cautery, it would take its proper place; he believed that discussion would mark a new era in the intelligent use of the electrocautery in nasal and throat practice. It is not used so frequently in the treatment of catarrhal conditions as formerly, because of other methods which make it unnecessary. When an obstructive lesion of the septum is removed, the necessity for the use of the cautery is thereby diminished.

That it is still a valuable adjunct to the treatment of turgescent rhinitis, in granular pharyngitis and various other diseased conditions of the upper respiratory tract is his confident opinion. In turgescent rhinitis the application of the cautery should be linear along the free turgescent border of the inferior turbinal. About one-third the length of the turbinal should be cauterized at a sitting. There should be subsequent sittings at intervals of one week. Six sittings are thus required to cauterize the full length of both turbinals.

Dr. MAYER, New York City, said that the indiscriminate use of the cautery must be discountenanced. It has been the practice of physicians without any rhinologic experience to put the cautery into the nose and create untold mischief. In the hands of the competent rhinologist there are conditions in which it is to be used. But it is of harm when in the hands of the unskilled physician.

IS IT NECESSARY TO OPEN THE ANTRUM IN EVERY CASE OF MASTOID OPERATION?*

GEORGE F. COTT, M.D. BUFFALO, N. Y.

Mastoid operations are performed by the surgeon, ophthalmologist, otologist, laryngologist and the general practitioner. When done by these promiscuous gentlemen (excepting the otologist) it nearly always is for acute mastoiditis. This paper deals with the acute variety only, and therefore comes within the province of all physicians. After acute suppuration of the middle ear, there will be pain in the mastoid region with or without swelling. Pain is commonly present especially upon pressure over the region of the antrum or at the tip of the mastoid process. When there is great infiltration over the mastoid, there is no doubt of periostitis and an incision may find pus present. In such case it is always good surgery to open the cells. If pain is constant and severe, especially after grippe or other zymotic disease, the cells must be opened and if no pus is found superficially, it is necessary to penetrate to the antrum where it will surely be discovered. This differs very much from chronic cases. If pain is constant, deep seated and severe, often radiating over the side of the head, pachymeningitis or epidural abscess may be the case. Another class of cases requires very different treatment. When the patient comes under observation, his physician will tell vou he had acute middle ear inflammation with suppuration, but the discharge stopped several days ago; since then, however, he has had considerable pain over the mastoid process, with swelling over a large area of scalp. You examine the ear and find it quite dry; perhaps an opening still in the drum head. Again, when a patient has gone for six or eight or ten weeks (as I have recently noticed in two cases) with a great deal of pain, requiring

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quantities of morphin to give sufficient relief for a limited amount of sleep, the destruction of bone may have involved the inner table of the skull and then have led to intracranial mischief. In the larger cities these results are hardly ever seen; but in our smaller towns, I am sorry to say, they are more common.

Occasionally in a mild case suppuration has ceased for some days, then swelling begins behind the ear, pain at first is troublesome, but after a few days subsides, remaining tender, however. You make an incision over the mastoid and find pus in varying quantities, usually in large amount; you then apply a sharp spoon and clean off the skull above and back of the ear, and your patient will promptly get well without opening the mastoid cells. When, on the other hand, the pain is deep seated and constant often at the tip of the mastoid with a large amount of infiltration, pus may be found under the scalp; but in addition, however, the cells must be opened where pus is invariably found. You now clean out the large cells until all the pus and débris is removed, then probe for those cells leading to the antrum, and if a solid wall is found shutting off the antrum from the cells or the cells external to the antrum are found dry and healthy your operation is complete and the wound is packed with iodoform or subiodid of bismuth gauze. The patient will recover without opening the antrum. The procedure must be left entirely to the wisdom of the operator. Some surgeons will open the antrum in every case, believing the operation never complete without. When mastoiditis occurs after the middle ear has recovered the antrum will usually be found dry also, in fact, probably has never been involved at all because the infection passed out of the middle ear by way of the periosteum, sheaths of vessels or more probably through the cells external to the antrum, between it and the middle ear. These cells are found in a certain percentage of skulls. If this anatomical possibility is kept in mind it may save the practitioner considerable anxiety and some difficult manipulation deep in the temporal bone.

One thing I think ought to be particularly cautioned against and that is a Wilde's incision for the purpose of evacuating pus without ascertaining what other important symptoms are present, such as fluctuating temperature, irritability and restlessness, chilly sensations, deep and radiating pain over side of head, very sensitive scalp on side of ear affected, etc. If these symptoms are overlooked and the physician's attention concentrated entirely on the apparent mastoid disease, his patient will quickly succumb to the deeper lesion within the skull.

It may be a very good thing for the practitioner to be self-reliant; but when he sees a patient gradually growing worse it is more to his credit to seek consultation than to lose the confidence of patient and friends. It may also be noted that the patient's statement can not always be relied upon, for I have found in several instances where the patient claimed a first attack, the middle ear manifested old destructive trouble long forgotten.

This paper was prompted by several writers claiming that in every instance of mastoid operation the antrum should be opened to insure a good result. I think I differ, as you have noticed in my foregoing remarks. Nor do I stand alone in this matter. Dr. Max Kaiser several years ago read a paper before the Academy of Medicine of Buffalo relating three cases in which he did not find it necessary to open the antrum to get a complete recovery. Professor Doctor Stetter, in the Berliner klinische Wochenschrift, No. 38, 1899, antedating us by several years, says it is still a mooted question whether always to open the antrum. The following cases will speak for themselves:

Case 1.—Man, aged 40, brewer, working in a beer cellar where the temperature is always very low, was taken with pain in the ear one day, followed by discharge, which ran an ordinary mild course, and in about two weeks got well. After a few days he complained of pain behind the ear, when he was sent to me. At the German Hospital he was anesthetized and Wilde's incision made; pus was found under the scalp, which was detached from the skull for four inches upward and backward. After curetting, the wound was packed and a bandage applied. The patient made an uninterrupted recovery.

Case 2.—Brewer, aged 44, drank large quantities of beer, having a typical roseate beer face. Deep-seated pain over mastoid behind the ear, lower than upper meatal wall. Previously he had had middle ear inflammation, followed by discharge of pus, and recovered, the ear having been quite dry for several days. Mastoid cells were opened after cutting through an inch of infiltrated tissue, pus was found in lower cells, which were cleaned out. No communication was found with the antrum. Wound was packed and patient made a good recovery. In beer "guzzlers" anesthetics act badly, for they do not go under the anesthesia very well and sometimes not at all, and occasionally one dies from the effects of the anesthetic a day or two later without any other assignable cause. In this case we first gave ethyl chlorid and he was off in less than two minutes, when chloroform was substituted.

CASE 3.—Italian, aged 23, looks older. A patient of Dr. Julius Ullman, who asked me to see him at the German Hospital. He gave me a history as follows: Three days before the patient called on him to prescribe for a severe pain in the ear of but a few hours' duration. The next day Dr. Ullman found the drum head bulging and punctured it, letting out considerable serum, which gradually turned to pus. Pain was referred to the mastoid region, when my attention was called to the case on the third day after its onset, which, by the way, was due to a mild attack of pharyngitis. I found a large quantity of pus in the external canal and considerable pain over the mastoid near its tip, but more over the antrum. The patient was immediately chloroformed and the mastoid cortex removed. Pus in moderate quantity was found in the lower cells right under the cortex. It was, however, thought advisable to clean out the mastoid and ascertain the condition of the antrum. No more pus was found, but the cells were easily broken down. After cleaning out all the softer bone, I could find no antrum after very careful search. The mastoid was excavated as much as possible without injuring the deeper parts, but no antrum came into view. The wound was washed out, the canal likewise cleaned and both packed with iodoform gauze. The third day the wound was dressed; slight moisture was observed on inner end of the gauze. Patient felt good and improved rapidly.

Case 4.—This was similar to Case 2, with a like result, and need be mentioned only.

I believe our text-books make very little, if any, mention of this class of cases, yet they occur every once in awhile, and when recognized do not expose the patient to needless operation.

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DISCUSSION.

Dr. S. H. Large, Cleveland, Ohio, said he agreed with Dr. Cott, who he understood meant only patients in acute cases. As a rule, after all the cells have been removed and no signs have been found of the antrum being affected, it stands to reason that no operator would open the antrum. These are cases that should not be closed with blood-clot, but should be left drained, because it is very difficult to determine whether all the diseased conditions have been removed. In mastoiditis, following the old chronic cases, the antrum must certainly be opened, because then a radical operation should be done. For doing a simple operation, nitrous oxid with oxygen makes an ideal anesthetic. Dr. Cott spoke of the Wilde incision. Dr. Large considers it nearly obsolete.

Dr. Dundas Grant, London, Eng., referred to a very remarkable article on this subject by Dr. Politzer. It was there pointed out that very often a large cell containing pus may be sequestered from the rest of the mastoid cells and cut off entirely from the antrum. In many cases by opening this simply, without opening into the antrum. Dr. Politzer got the desired result.

Dr. Grant had several cases answering this description, and has treated them exactly on the same principle, but he has not found it universally successful. When the lining of the cell wall is not eliminated the whole thing can be evacuated and the probability is in these cases that the cell has been part of the original structure of the mastoid. Mastoid involvement is more probable in those cases in which the cell is extremely large and sometimes the cell is as large as a small hazel nut filled with pus. But in these cases the evacuation is all that is necessary, and will answer perfectly Dr. Cott's treatment. There are others not so clean cut. Most operators desire to be assured of the condition of the antrum, and only a small opening is made in the antrum, as often no pus is found. And that opening into the antrum sometimes leads with great rapidity to the subsidence of the suppuration in the tympanic cavity. One thing should be avoided which formerly was done, and that is putting in a curved scraper. Apart from that it is a great satisfaction to have found out the condition of the antrum, although there are cases in which the cell is found.

A MEMBER said that one cardinal principle should be kept in mind, and that is that in the case of deep-seated inflammation of the mastoid tympanic cavity it is extremely hazardous to neglect opening the antrum. He himself had found no harm from doing so. He then feels that he has done everything that can possibly be done, and with the radical operation a much quicker result and much quicker healing is obtained than if a simple operation were done. The old simple operation in his hands has led to a tedious recovery.

Dr. Percy Fridenberg, New York City, called attention again to the fact that infection usually proceeds from the middle ear to the antrum so that the antrum might be expected to be infected even when no other cells are. As a matter of fact, when the mastoid process is opened it is not known beforehand where pus is. In one case the antrum is healthy, in another case the tip is cleared out and found free. Then the zygoma cells may be affected. That simply teaches the lesson that when the mastoid is opened for good cause every single cell must be examined and cleared out. There is no other course. If a good light is used there is no objection to going in and cleaning out the antrum thoroughly.

Dr. Joseph C. Beck, Chicago, said that the only cases that he prefers to operate on by this method are cases in children. From the anatomic standpoint certainly, because there may be mastoiditis or rather periositis, a perforation through the squama, with all the evidence of mastoiditis, but on exposing the mastoid process and reaching the antrum it is perfectly healthy, and in those cases the chipping off of the cortex may be all that is necessary, finding that it is healthy in every respect. But whenever an operation is undertaken, if symptoms are clear of mastoiditis, there is no reason for not going in the antrum, not necessarily curetting the antrum, but relieving the tension by opening the antrum wide and stopping there. Dr. Beck called attention to a point in diagnosing whether the antrum is clear or not. He said that he did not want to be premature in his experiments, but he had carried out some experiments with radiograph examinations, what he calls tympano-mastoid radiography, which shows to some extent whether the antrum is markedly filled or not.

DR. VAIL, Cincinnati, Ohio, said he would give a good working rule to solve this problem as to whether to open the antrum or not, apart from the use of the x-ray or the auscultation method. If a case of mastoiditis shows pulsation in the deep parts of the auditory canal, and if there is abundant secretion from the auditory canal, certainly the antrum should be opened. The pus which flows from the middle ear in such quantities does

not come from the middle ear alone. The small amount of membranous lining could not secrete that great quantity of pus. It is overflowing from the mastoid region, and in such cases the antrum is undoubtedly full. How can there be drainage in such a case without opening the antrum? Moreover it is one's duty to open the antrum in all such cases because the secondary object—he would not say the principal object, because the principal object is to save the patient's life—is to conserve the hearing, and that object will be very much facilitated by allowing the pus to drain out through the mastoid opening, thus giving the middle ear a bit of rest. It will then have a chance to conserve the hearing, while if the antrum is not opened this result cannot be attained. Therefore, when the middle ear is discharging profusely, and the pulsation is deep in the auditory canal, in every case open the antrum.

Dr. W. Sohier Bryant, New York City, said that a fixed medical or surgical rule without the recognition of the ever-present exception is very dangerous, and this is as much the case in mastoid surgery as anywhere else. But if it is absolutely necessary to have a rule in reference to this branch of surgery the rule to abide by is, always complete the mastoid exenteration when it is begun.

Dr. George F. Cott, Buffalo, N. Y., said that the best proof whether he was right in doing as he did is the fact that the patients all recovered without infection. One point that had been overlooked in the discussion was that when the antrum is not to be opened the ear will be found to be dry. When the ear is dry the tympanic cavity and antrum are invariably dry. If considerable pus be found in the external meatus the chances are very much that the patient's ear was never cleaned in an acute case. He has seen that in a case of three weeks' standing, with considerable pus in the external canal, but after cleansing found the ear dry. He did not open the antrum, and the patient got well. When there is manifestations of abscess in the middle ear, open the antrum in every case. Dr. Large indicated when to open the antrum, viz., when there is pus there, but when that cavity looks right do not open the antrum in any case; the patient will get well. That may be too positive. Dr. Cott has had two or three cases; they are rather rare, and it is because they are rare that he had brought them before the society. He was very glad to know that Dr. Politzer and he stand alone in this matter. [Applause and laughter.] Regarding Wilde's incision, while that method is obsolete, he would like to ask Dr. Large what he would have done in the first case reported in the paper in which no cell was opened and he passed along the scalp to the extent of four or five inches. What kind of opening should be made? Dr. Fridenberg considers it hazardous not to go into the antrum. When there is a dry middle ear, even though some pus may be in the external canal, a dry antrum may be expected; it is not necessary to open it, and there will not be reinfection.

Referring to Dr. Beck's statement that it is not necessary to open the antrum in children, Dr. Cott said, it depends on the age. If the child is very young the antrum is entered the moment the cortex is passed. In closing, Dr. Cott said that when the antrum has not been opened and the ear is dry, it will get well within eight or ten days if it is allowed to heal

by blood clots. It is an ideal condition for blood-clot healing.

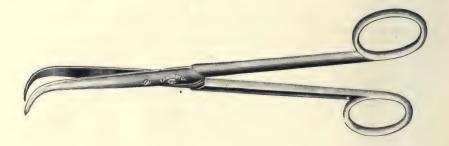
IMPROVED NASAL SCISSORS.

O. A. GRIFFIN. M.D.

ANN ARBOR.

Having employed, during the past few years, several of the different kinds of scissors and saws which were devised for a partial or complete removal of the inferior turbinated bone, and finding none which afforded complete satisfaction, I devised a form of nasal scissors which contains several features not combined elsewhere, and which I herewith present.

It will be observed first, that the instrument is strong, and yet neatly shaped. The blades are short and as slender as is consistent with strength. The joint is small and rounded. The handles are joined to the blades at an angle so that the vision is not obstructed,



and are of sufficient length, in connection with the short blades, to afford sufficient leverage to remove hard and large inferior turbinates with ease. The blades cut instead of crushing the tissues, as tends to occur with scissors possessing long blades. Two or three snips as the scissors pass backward into the nasal cavity are all that is required to remove the bone, which in favorable cases can be accomplished in fifteen seconds, as compared to several minutes when the nasal saw is employed. The operation being short, there is no time for hemorrhage to occur, and the shock to the patient is accordingly reduced. The wound being smooth, heals very readily, while the afterbleeding is, in my experience, not any more profuse than when the saw is employed. The ring handles afford a firm and yet delicate grasp of the instrument compared to the heavy straight ones which are provided on some other models of scissors which are held in the palm of hand.

This instrument is made by F. A. Hardy & Co., Chicago.

SOME IMPROVED NOSE, THROAT AND EAR INSTRUMENTS.

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CHICAGO.

Since our meeting at Denver two years ago I have made some further improvements in the tonsillotome I there exhibited. The change consists chiefly in the new position in which the handle is attached, as shown in the cut. This tonsillotome, as originally made, is illustrated and described in *The Laryngoscope* of December, 1904, and a complete description of this latter and improved form was published in the *Annals of Otology*, *Rhinology and Larnyngology* of June, 1906.



Fig. 1.-Improved tonsillotome (1/2 size.)

I have found this forceps to be of use when the surface of the tonsil is very friable, making it necessary that a deep hold shall be taken, while, owing to the slight space required by the scissors handles, it is of particular value in doing a tonsil operation on a child under general anesthesia. By use of the four rings as a handle it is easily used upon either tonsil when held in either hand. While this instrument is new since our last meeting it was exhibited at the November meeting of the Chicago Laryngological and Otological Society and shown in *The Laryngoscope* of December, 1905.

In doing an operation in a cavity, as a tonsillotomy, when general anesthesia is employed, a bright and easily directed form of illumi-

nation is of the greatest importance. To depend upon daylight, or upon a lamp held by an assistant, even with the help of a head reflector, is, in either case, trying, and the small electric head lamps requiring low voltage give a light thoroughly inadequate. A half dozen or more head lamps for use without a rheostat, and with the 110 v. current, have appeared during the last few years. These lamps have all developed a disagreeable amount of heat when used



Fig. 2.—Four-ring tonsil forceps (2/3 size).

for any length of time, and with most of them it has required holding the head in a strained position in order that the light be directed to the field of operation. In the device here shown the electric lamp is supported at the end of an adjustable bar which carries at either end a ball and socket connection whereby the lamp is held



Fig. 3.—Electric head lamp (1/6 size).

about three inches away from the head while its rays are easily thrown upon the desired point, the operator's head and eyes meantime being in a perfectly easy and natural position. The lamp supporting bar consists of two pieces, firmly held together by three screws, the central one of which regulates the amount of friction applied to either ball and socket joint. By thus having the lamp a distance away from the head the heat is much less noticeable, and is

furthermore diminished by the use of only an eight-candle lamp, so constructed as to heat to the minimum degree when in use. The head band is of spring metal with padded extremities and the connecting cord is provided with a safety disconnector so the current can be easily broken, or so the operator can go about the room. The insulation is perfect, so the wearer can in no way receive a shock. In order to concentrate the rays of light, and to furthermore protect or shade the wearer's eyes the lamp is covered with an aluminum parabolic reflector. This lamp has been perfected for me by Wm. Meyer & Co., of Chicago.



The essential feature in this new handle is that the contact is secured by the sliding of one tube in another whereby the possibility of corrosion is overcome and a perfect contact always assured. By a spring mechanism the current is automatically broken as soon as pressure is released from the contact lever. The electrode sockets are made extra long and are conical, like the handle ends of the electrodes, so perfect contact and a tight fit are secured independent



Fig. 5.—Tonsil cautery electrodes (4/5 size).

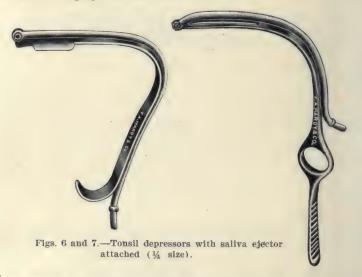
of the set screw, being, therefore, entirely free from the usual annoying wobble heretofore generally present. Furthermore, the electrode is held at an angle of about 110 degrees from the line of the handle which affords much greater ease in use, whether the handle is held vertical or horizontal, thus being several degrees less than the angles generally employed. The sockets for the cords with the set screws are also extra heavy and solid. This new handle has been made in accordance with my suggestions by The Victor Electric Company of Chicago. A windlass for the hot snare, while not shown in the cut, is supplied with the handle.¹

^{1.} Illinois Medical Journal. September, 1906.

The cautery electrodes I now use for tonsil work are of a new style and are thoroughly aseptible, being made of two semi-circular wires twisted about a strip of fiber and are $5\frac{1}{2}$ inches in length. The burning point is of irido-platinum wire of No. 24 gauge.

By the addition of a saliva ejector tube to these standard and previously described tongue depressors^{2, 3} an extra convenience is secured.

It occasionally occurs that a patient is unable by the usual methods to close the soft palate against the pharynx when it is desired to do inflation by the latter day (no water) method of Politzer. In such case the desired contact may be secured by mechanical means for which I employ the instrument shown.



The Freer forceps, while an efficient instrument, possesses one drawback which I have aimed to overcome. I allude to the oval bite, back of which is an open space in which tissue may enter so as to prevent the withdrawal of the closed instrument without tearing the parts. I have changed the oval to an oblong bite with straight edges and one by which all tissue engaged is fully severed. The further advantage of the latter over the former style of bite, in order to leave a smooth edge to the operated bone, is apparent. I have, furthermore, added a roller bearing to the contact end of the handle spring and a ring at the proximal end of the lower handle for the little finger of the grasping hand, thereby preventing any tendency to slip in the hand when fully opened. This ring is also of

^{2.} The Laryngoscope, February, 1897.

^{3.} The Laryngoscope, December, 1904.

use to hold the forceps when, for example, freeing the wound from blood before taking another bite. In this way the necessity of laying the forceps upon the stand is avoided. Additionally, by means of a small set screw located at the upper end of the fixed handle, the maximum spread of the biting blades can be adjusted as desired.

This forceps I have had made in three sizes, and with the largest one good-sized pieces can be removed from the perpendicular plate of the ethmoid during the window resection operation the same as with the Foster-Ballenger forceps, while the two smaller sizes are used in place of the Freer forceps alluded to. The shaft of the middle size (a) is twisted 90 degrees, the same as the Freer instrument, while the largest size (b) is twisted only 45 degrees, which I find to be the best angle for the purpose for which it is intended. The smallest size (a) is untwisted and serves also admirably as a synechia biting forceps. All of these instruments are dissembled by removing a spring set locking pin in place of a screw, as in the Freer instrument (not seen in cut).

For operations upon the turbinals, Gruenwald designed a scissors



Fig. 8.—Soft palate closer (1/2 size).

the value of which has been indorsed by extensive use, though I have found at times that it did not possess sufficient power. In order to overcome the defect I have had attached to the handle, shown in Figure 9, the Gruenwald scissors (d), thereby securing all the power ever required.

This instrument, I find, will at all times take the place of the Hajek blunt elevator. I have given it a slight bend on the flat. whereby when turned one way it is more suitable for working in a concavity, while when reversed it becomes more suitable for working on a convexity. The bend, though, is so slight that it may be used in either direction upon a plane surface. Lastly, it will separate as well on the pull as on the push, which is at times of great advantage as the periosteum not infrequently, when there are points of adhesion, can be better separated by working from behind forward, at least up to the point of greatest adhesion, than by working rearward as is the usual custom.

I have found these small elevators, shown in Figures 11 and 12. are sometimes efficient when the larger elevators can not be used to advantage, particularly upon pronounced bends well forward.

This speculum can be fully operated with one hand and quickly adjusted as required so as to remain fixed at any desired degree of spread, or can be instantly closed by pushing up the locking ring with the thumb. It also serves, like the Beck instrument, as a means of holding the two perichondria in apposition while the nostrils are being packed with gauze after the completion of the window resection operation.

Since its introduction by Bosworth the nasal saw has become one of the most useful instruments in the armamentarium of the rhinologist. The fact that numerous patterns have from time to time been advised by different operators proves that the varying conditions present require a corresponding variation in the saw best adapted to the particular case being operated. Therefore, a variety of saw

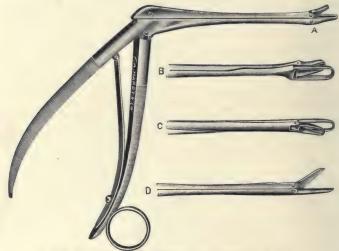


Fig. 9.—Nasal punch forceps (and shears) (1/2 size).

blades is to be commended. In the device being described only one new style of saw blade is shown, the chief originality being in the adoption of a hollow handle which serves as a receptacle for the blades when not in use, thereby avoiding the features of misplacement or injury. While ten blades of uniform length are shown the handle holds only six, which is sufficient for general use. They are indicated in the cut by letters from a to j. The first six are suggested as the best selection for general use, though this number may be either reduced or varied at the option of the purchaser. The blades shown are as follows:

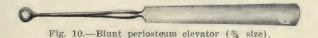
a and b.—McAuliff's probe-pointed bevel-edged saws, the advantage of which is that they hug the wall from which the growth is being removed, the most elevated edge being against the wall.

c and d.—Author's saw blades curved on the flat and probe pointed, being of particular value in the removal of anterior thickenings of the septum which are low down or springing from the nasal floor.⁴ This saw is also of use, as suggested by Vail,⁵ for enlarging the opening into the antrum after puncture through the inferior meatus has been made.

e.—DeVilbiss' cross cut saw, very small and delicate.

f.-Bosworth's saw.

g.—Webster's probe-pointed saw for posterior growths made extra thin at a point near the handle end so when in use the bend upon pressure will be angular at the thin point, leaving the rest of the



blade straight, thereby facilitating easy cutting. With a blade of uniform thickness, when not too thick or rigid, there is a tendency for the whole blade to curve when operating a long ridge back of an anterior concavity in the cartilagenous portion of the septum so the saw is soon found to bind. With the Webster blade this trouble is overcome, and I have often found it to be an extremely valuable instrument for removing ridges from the vomer.

h.—Holmes' saw for the inferior turbinal.6

i.—Author's inferior turbinal saw.



Figs. 11 and 12.—Small angular blunt periosteum elevators (3/7 size.)

Enlargement of the bony portion of the anterior end of the inferior turbinal is an occasional cause of nasal stoppage. When the scroll reaches too far down, or near the floor, with the accompanying hypertrophy of the covering soft tissue, nasal drainage may be so impaired as to cause much trouble, and particularly tubal stoppage, as observed by Holmes. By the use of his saw (h) he advises division of the lower portion of the scroll, followed, of course, by amputation of a sufficient portion of the soft tissue. In this way impairment of drainage is corrected and relief given for those untoward symptoms due to the defective drainage.

^{4.} Annals of Otology, Ithinology and Laryngology, February, 1900.

^{5.} Transactions of the Academy of Ophthalmology and Oto-Laryngology, 1906.

^{6.} The New York Medical Journal, Sept. 29 and Oct. 13, 1900.

In certain cases I have found that a further difficulty is to be overcome, viz.: When the enlarged scroll not only reaches too near the floor, but when also the upper portion thereof is too near the septum. In such case the Holmes operation does not fully correct the deformity. Therefore, the logical thing to do, after the Holmes operation, would be to fracture the upper part of the scroll so as to cause the remaining and projection portion of the turbinal to drop in its natural position, but, owing to the green-wood elasticity of the bone, it will not so fracture as desired. By now using my turbinal saw, entered beneath the scroll, and cutting upward and through the bone until its resilience is destroyed, the projecting turbinal can be easily pressed down as desired and retained in its



Fig. 13.-Mucosa speculum. (1/2 size).

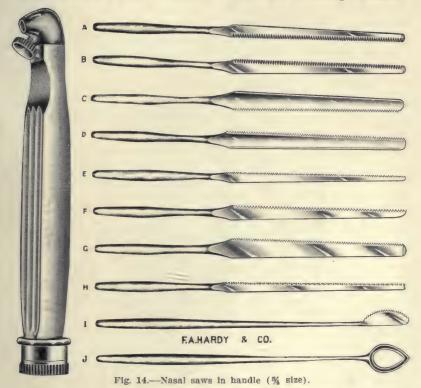
new position by the use for a day or two of a Bernays-Simpson tampon. In this way the anterior hypertrophy of the inferior turbinal is fully corrected.

j.—A spoke shave is added as a valuable adjunct to the set of nasal saws.

In a comparison of the many nasal saws which I have from time to time examined or purchased I find that the length of the blade varies from 3 to 6 inches and that the cutting edge varies from 2½ to 3½ inches. I have compromised by making all of the blades in this set of saws of a uniform length of 4½ inches and the cutting edge of each (excepting i) 2½ inches long, which dimensions will meet all requirements.

A further study of the saws of the past discloses the fact that there is a great variation in the angle at which the blade is attached to the handle, generally ranging from 110 to 140 degrees. After considerable experiment I have selected an angle of 115 degrees as being, for different reasons, the best, it allowing the hand to be held in the most easy and natural position and with least bend of the wrist.

The handle end of each blade is made round and conical so a tight fit without wobble is secured, regardless of the locking screw. An additional advantage of this arrangement is that the blade can be rotated to any position desired. Formerly by reversing the blade



it could be made to cut either upward or downward as the handle was held in its usual vertical position. I have found it at times advantageous to revolve the blade only 90 degrees from the vertical, in which case the handle is held horizontal instead of vertical, giving thereby an easy motion. This latter position would not be of use with the usual small handles employed, while in my saw, with a large handle which can be firmly held in the hand, this horizontal position is practical and at times more convenient for easy work. The set screw is located below the blade and toward the operator, serving as a rest for his thumb.

This device is made by making certain required changes in a DeVilbiss spray apparatus, and hence is of a convenient size to hold in the hand and is operated by the use of compressed air, therefore, the strength of suction can be easily regulated by adjusting the controlling valves of the air tank. I have found it of use for a variety of purposes, with the different extensions shown in cut, viz.:

A. A hard rubber conical extension, more pointed and longer than "B," which can be introduced into a soft rubber tube or catheter. Its value in other departments of practice, aside from otology and laryngology, is apparent.

B. A short hard rubber conical tip (covered with a soft rubber



Fig. 15.—Compressed air aspirator (1/2 size).

cap) is used in the external auditory canal after a paracentesis or in the treatment of suppurative otitis. It can also be applied to the Eustachian catheter when in situ to remove secretions from the tube. It is a mistake to think that a tip of any kind when used with an Eustachian catheter must exactly fit the conical opening in the catheter end. Any tip, when not too large, if covered with a bit of soft rubber tubing, will be found, with moderate pressure against the catheter opening, to be air tight, and its use is thus far more agreeable to the patient as well as more convenient to the operator. With this tip in the external canal, with a moderately strong suction, and with a succession of interruptions by operating the cut-off lever, it gives the "suction with release" current, which is of such

value in the treatment of catarrhal deafness when the drum head is thick and retracted.

C. A metal tip with expanded end so bent as to give a lateral opening can be turned in either direction for the removal of ton-sillar secretions. For this use a strong suction is required. When the same tip is turned with point up it serves as a means of grasping the uvula during a postrhinoscopic examination, being of particular value when the uvula is either elongated or enlarged. The traction can be sufficient to act slightly as a soft palate retractor.

D. A long soft metal tip, which can be bent as desired, is of inestimable value for the removal of blood during an operation and is far superior to the cotton swab. It is of especial value when doing a so-called "window resection" operation. If the tube becomes stopped by a blood clot it can be instantly freed by closing the air escape when the negative is converted into positive air pressure.



Fig. 16.-Yankauer-Pynchon cut-off (% size).

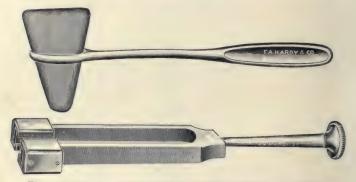
E. With this device is furnished a hard rubber tip, like those used with hand nebulizers, for the external nasal opening. When inserted in one nostril, while the other nostril is tightly closed, as well as the posterior end of the nose by pressure of the soft palate against the pharynx as in Politzerization, a moderate suction can be secured which has some effect on the sinuses in acute conditions, though with air pressure as ordinarily obtainable, it may not serve for the application of Sondermann's method of treating atrophic rhinitis and empyemic sinusitis.

F. A bell extension about one-half inch in diameter, not shown in cut, is of use as a drp cup or in the application of Bier's method of producing passive congestion. With another bell, suitably shaped for the eye, either continuous suction or suction with release could be secured.

^{7.} The London Lancet, Aug. 12, 1905, p. 435.

Used without any extension tip, it serves as an efficient wet cup or "artificial leech," the distal end of the suction tube being concave. In order to derive the greatest value from the use of this device it is necessary that it be operated with a positive working and "instant" cut-off which gives exit to a liberal sized air stream such as I next describe. At an early date I propose writing a more extended description of this aspirator and its uses, in which paper I will incorporate a broader consideration of the value of aspiration in medical practice.

At a meeting of the Section of Laryngology and Rhinology of the New York Academy of Medicine, Nov. 22, 1905, Dr. Sidney Yankauer exhibited a cut-off of a new design. As strong claims were made as to its superiority, I ordered one from the makers, George Tiemann & Co. of New York City. I saw at a glance that the device gave promise of great merit, though it possessed the unpardon-



Figs. 17 and 18.—Tuning fork and rubber hammer (2/5 size).

able defect of not being "instant." Furthermore, there at once occurred to me a means whereby, through the introduction of a small vent hole, this defect could be remedied. At my suggestion Messrs. Tiemann & Co. made for me a second cut-off in which this idea was embodied, as well as a few other minor changes. After several months' use of this cut-off I was convinced of its sterling merit, though its use developed other weak points, chiefly with the spring which actuated the thumb lever. I will here say that there are no springs or washers inside this cut-off to get out of order and that in its operation no use is made of the force of the air current as an assistance in closing the valve as is the case with other cut-offs. The control of air escape is regulated solely by the revolving of a conical metal plug which rests in a metal socket of similar shape and size. In fact, in simplicity this cut-off out-does all predeces-

sors, being all metal and, aside from the thumb lever and its spring, consists practically of but two pieces.

In place of the faulty spring I have had Messrs. F. A. Hardy & Co. apply an improved spring which I believe will stand the test of long usage. I also had them increase the weight of the thumb lever, which is likewise the friction spring for the valve, and, furthermore, I had them make the valve less conical than before, thereby insuring a tighter fit, which, in connection with the stronger spring, corrects a previous tendency to leak when heavy air pressure was used. In order to provide for an unexpected break in the rubber tubing, I have added an additional tube fitting which can be attached to a reserve tube, so should a leak thus occur the cut-off can be quickly changed from the defective to the reserve tube. I have also provided a set screw (not shown in cut), whereby the cut-off can be fastened in a correct direction to conform with the kink of the tube. In this way its outlet will always point directly toward the patient or in accordance with the operator's habit of use. With this cut-off, when the lever is swung to the highest point, a constant flow of air is secured, being of value in connection with the use of large office nebulizers. I might also add that this cut-off is easily taken apart or "dissembled" by spreading and removing the spring thumb lever.

I will, lastly, call attention to a tuning fork which I find of great value and one which I use with frequency for rapid ear tests. It was a Politzer fork with movable weights. These I found very unsatisfactory, often becoming unfastened and giving a rich variety of overtones. In place of the movable weights I have had applied on either prong of this fork a very heavy and securely fixed weight so adjusted as to give a C 128 V tone. Each weight is fastened by two solid set screws and is additionally soldered in place, so after several years' use there has been no change to the slightest degree in tone, which in this fork is singularly pure, being entirely free from the usual array and variety of overtones.

In order to secure a constant intensity, I find that use of a rubber hammer of good size to be the best method, the maximum blow being always given which at the start causes the weights to touch so as to give a bell sound, though at once followed by the desired pure C tone. Lastly, I have also had attached to the handle of the fork an enlarged terminus, making it better for bone conduction. All of these instruments as described are kept in stock by F. A. Hardy & Co., of Chicago.

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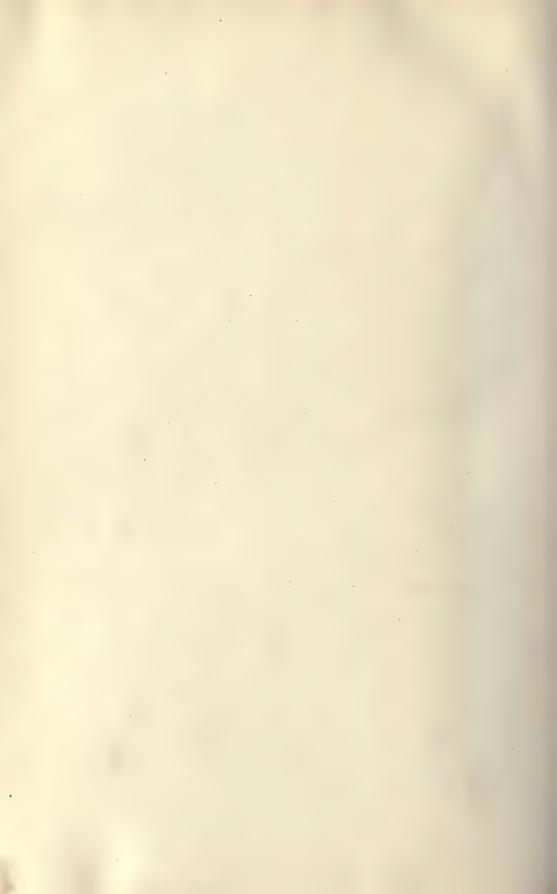
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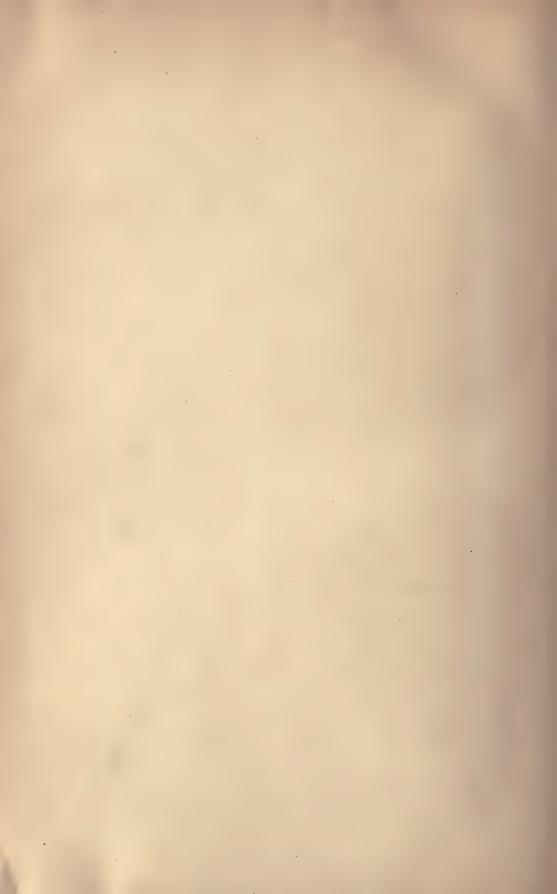
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| Jones, E. W | owa. Tenn. Ohio. N. Y. , Pa. Ind. N. Y. S. C. |
| Lamb, Robert S | Ohio, Ohio, Ohio, Ohio, N. Y. Owa. N. C. N. Y. Colo. Mo. Ohio, Mo. |

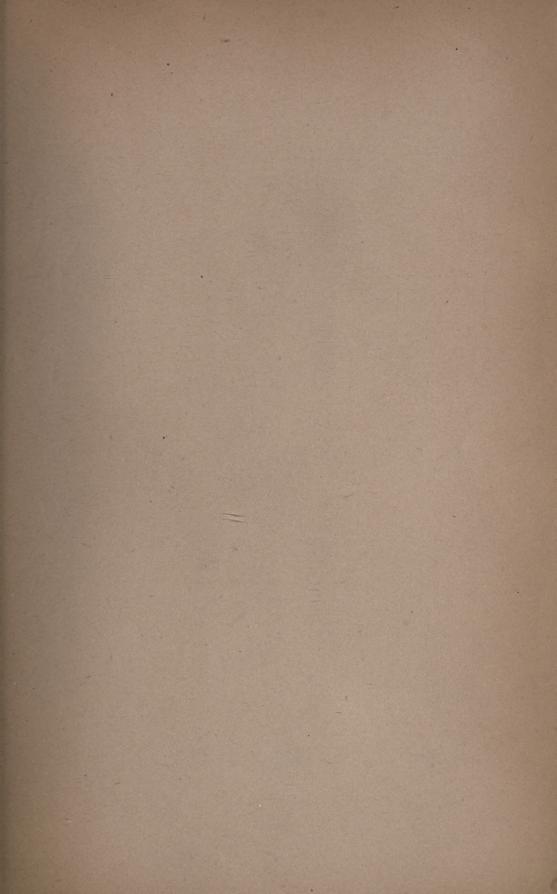
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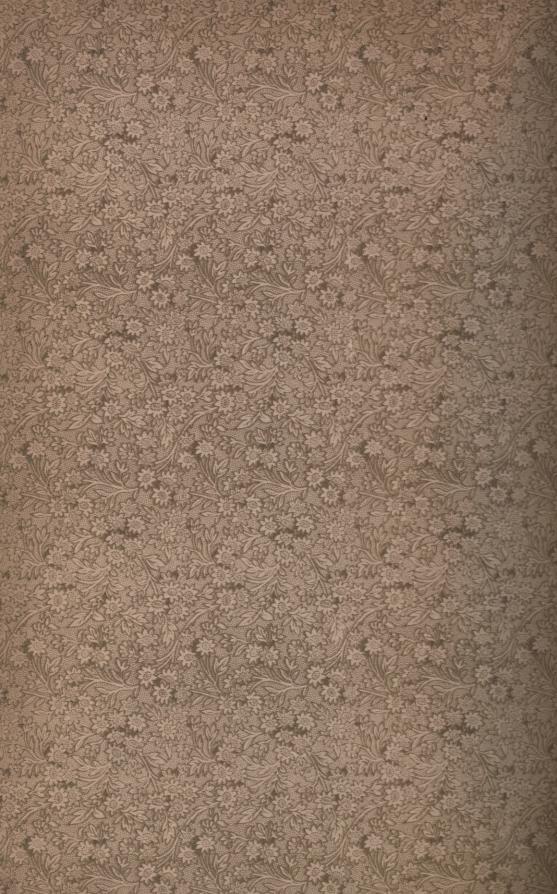
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